

# The Iron Age

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## The New Siemens System of Gas Firing as Applied to Boilers.

Mr. Frederick Siemens, of Dresden, has, after long and careful trials, satisfied himself that the methods of constructing and making gas metallurgical furnaces on the same principles as those using solid fuel are incorrect. He urges that they should be so arranged that the flame should only radiate heat upon the material to be treated, and not come in actual contact with it, as has hitherto been the case. At the Chester meeting of the Iron and Steel Institute he presented a paper explaining his views with special reference to metallurgical furnaces, to which we referred at the time. Mr. John Head went over much the same ground in a paper read early in January before the South Staffordshire Institute of Iron and Steel Works' Managers. The published reports of these papers do not give any drawings to show in what manner the changes proposed are carried out. That want is supplied, however, by a lecture by Mr. Frederick Siemens himself before the Verein zur Beförderung des Gewerbefleißes, at Berlin, which is accompanied by drawings of steel and glass melting furnaces, and of a design for boilers, which we reproduce. The boiler is arranged for direct gas-firing, an ordinary form being chosen to illustrate the application of the system to existing plants. The gas, which is made in a producer, not shown in the drawings, enters into a wide combustion chamber in front of the two tubes. It is provided with two doors for lighting the gas, cleaning the flues, &c. The flues for the gas and air enter into it from below. An arrangement may be easily provided for preheating the air. As will be seen from the drawings, the head of each tube is provided with fire-brick deflector rings, which are also inserted at regular intervals and at the end of every tube. The dimensions of the combustion chamber are so chosen that the flame can develop freely. It then flows through the tubes, the rings preventing contact with the iron. In the return flues the products of combustion are brought into as close contact with the boiler as possible. Mr. Head in his paper says on this subject:

To obtain the greatest benefit from this method of firing it is necessary that the boiler should be worked day and night, for, if only worked in the daytime, the saving effected by the use of gaseous fuel is not so great as when worked continuously. If flame is allowed to touch the sides of a boiler, there is, of necessity, smoke produced on its inside surfaces, and the radiant heat of the flame, not being able to penetrate such an atmosphere of smoke, the water in the boiler cannot get the advantage of it. It will readily be perceived how great a quenching effect the metal of the boiler has upon a flame when it is remembered that the temperature of steam, even at 60 pounds pressure—which is, of course, that of the boiler—is only 311° F., while that of the gaseous flame in contact with it is about 3000° F. In this application the principle has been followed of allowing the active flame to have free space for its development, and for the radiation of its heat within the length of the tube, and not allowing it to touch the sides until after complete combustion has been effected, when the products of combustion may be brought into direct contact with solid bodies. If the flame was allowed to play along the tube in the ordinary way, it would very soon strike against the upper surface and produce soot, but by the arrangement of deflector rings inserted in the tube the gas is not allowed to touch any surface until after complete combustion has been effected, and it will be noticed that by this means the flame has no discoloring effect on the tubes. By this arrangement perfect combustion is produced and there is no smoke.

But, besides this, a boiler fired in this manner lasts longer, as the plates are worn away more readily through direct contact with the flame than from any other cause. As the heat of the products of combustion come into direct contact with the sides or flues of the boiler and its regenerators, it is completely utilized, and the maximum of heating effect is thus insured. These results obtained in actual practice prove that almost all heating apparatus used in the arts in which there is no chemical necessity for direct contact of flame with the substances treated will be materially improved by the new method of heating.

## The Piece-Price System for an Ohio Prison.

The Ohio Senate has passed the House bill providing for the piece-price convict system in the Ohio Penitentiary. One year ago a law was passed abolishing the contract system, and with eight months' experience the management came out with a deficiency of \$50,000, and the project has been, since the assembling of the present Legislature, to

The piece price plan which was adopted gives the board of managers the control of the convicts and the power to regulate the hours which they are to work, while under the old plan the contractors had absolute control of the prisoners, so far as getting all the work from them which could be wrung out. The present bill was opposed by labor organizations throughout the State with as much force as was the contract system, on the ground that the wares manufactured

country are 71.3 times that of the London and Northwestern, and at the same rate of destruction by wear the quantity of steel rails required for replacement on all the roads of this country would be only about 438,000 net tons. The consumption of rails in 1883 in this country was about 1,400,000 tons, of which 6500 miles of new road required perhaps 650,000 tons, leaving 750,000 tons for replacements both of iron and steel. It may be inferred that the destruction of

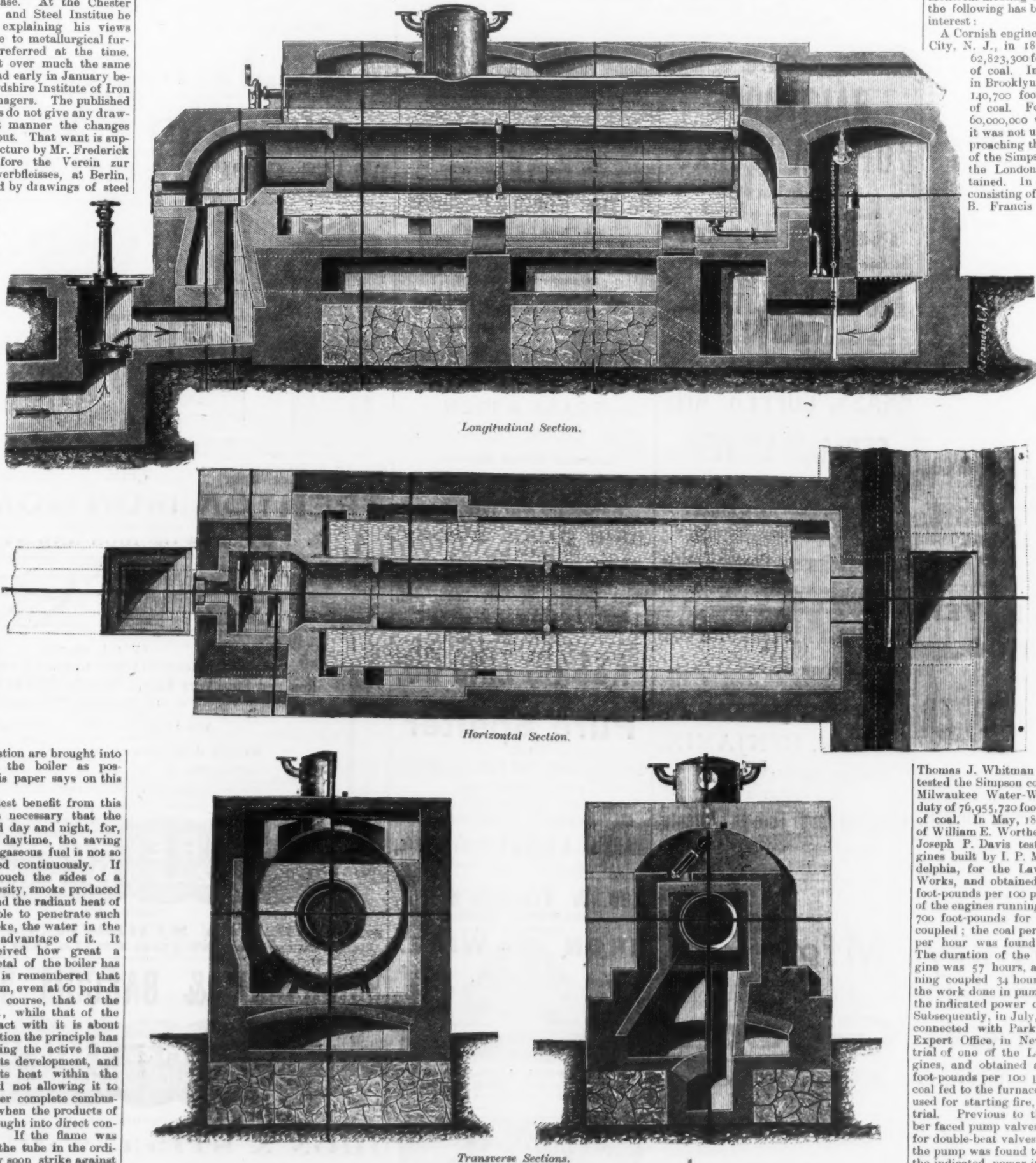
## Economy and Duty of American Pumping Machinery.

It has been the custom in America, and particularly in the United States, to have expert duty trials, conducted by engineers of acknowledged reputation, whenever new engines were erected at prominent water works. From a number of reports of such trials, says Mr. E. D. Leavitt, Jr., of Cambridgeport, Mass., in a paper read before the Montreal meeting of the British Association, the following has been selected as of leading interest:

A Cornish engine that was tested at Jersey City, N. J., in 1857 developed a duty of 62,823,300 foot-pounds per 100 pounds of coal. In 1860 a rotative engine in Brooklyn developed a duty of 60,140,700 foot-pounds per 100 pounds of coal. For several years a duty of 60,000,000 was rarely exceeded, and it was not until 1873 that a duty approaching that recorded for the trials of the Simpson compound engines in the London Water-Works was obtained. In July of that year a board consisting of John C. Hoadly, James B. Francis and W. E. Worthen tested the Simpson compound engine, built by Henry G. Morris, of Philadelphia, at the Lowell Water Works, and obtained a duty of 93,002,272 foot-pounds per 100 pounds of coal. This trial was of 57 hours' duration. In December of the same year a board consisting of William E. Worthen, John C. Hoadly, J. P. Kirkwood, Charles Hermans and Joseph P. Davis tested the compound pumping engine at Lynn, Mass., built by I. P. Morris & Co., of Philadelphia, and obtained a duty of 103,923,215 foot-pounds for every 100 pounds of coal fed to the furnaces. This trial was of 52 hours' duration, and the experts, in making their report to the Lynn water commissioners, said: "The duty given by your engine is, so far as we are aware, the highest that has ever been obtained by trial test of any pumping engine in this country."

In May 1875, a board consisting of William E. Worthen, Thomas J. Whitman and Charles Hermans tested the Simpson compound engines at the Milwaukee Water-Works, and obtained a duty of 76,955,720 foot-pounds per 100 pounds of coal. In May, 1876, a board consisting of William E. Worthen, John C. Hoadly and Joseph P. Davis tested the compound engines built by I. P. Morris & Co., of Philadelphia, for the Lawrence (Mass.) Water-Works, and obtained a duty of 96,186,779 foot-pounds per 100 pounds of coal with one of the engines running singly, and of 98,261,700 foot-pounds for both engines running coupled; the coal per indicated horse-power per hour was found to be 1.684 pounds. The duration of the trial of the single engine was 57 hours, and of the engines running coupled 34 hours. It was found that the work done in pumps was 81 per cent. of the indicated power of the steam cylinders. Subsequently, in July, 1879, Mr. R. H. Buel, connected with Park Benjamin's Scientific Expert Office, in New York City, made a trial of one of the Lawrence pumping engines, and obtained a duty of 111,548,925 foot-pounds per 100 pounds of coal, all the coal fed to the furnaces, including the wood used for starting fire, being charged to the trial. Previous to this trial, annular, rubber faced pump valves had been substituted for double-beat valves, and the efficiency of the pump was found to be 91.64 per cent. of the indicated power in the steam cylinders. The coal per indicated horse-power per hour was 1.63 pounds, and the feed-water per indicated horse-power per hour, 16.48 pounds. In October, 1878, a board consisting of Walter H. Sears and Isaac N. Scott tested the Corliss pumping engine at Pawtucket, R. I., and obtained a duty of 104,357,654 foot-pounds per 100 pounds of coal, on the total coal consumed, including the wood used to start fires (estimated at 40 per cent its weight in coal). This trial extended over a period of two weeks, the running time being 10 hours a day. The same parties made a continuous test of 24 hours, with the same engine, and report a duty of 133,522,060 foot-pounds per 100 pounds of coal. A full description of the Pawtucket engine may be found on page 189, Vol. XXVIII, *Engineering*. The pumping engines at Lawrence were fully described in *Engineering*, Vol. XXIX, pp. 18 and 19. In April, 1877, Messrs. Moses Lane, Charles H.

(Continued on page 5.)



THE NEW SIEMENS SYSTEM OF GAS FIRING AS APPLIED TO BOILERS.

adopt some plan by which they could make the institution self-supporting, or as nearly so as it was under the old contract system. Many of the members were in favor of restoring the contract system and pronouncing as a failure anything which looked like reform in the management of criminals, but the advocates of reform secured enough votes to carry through the measure. The question of abolishment was made a political one in the campaign two years ago, and it is for that reason that both parties now are in favor of giving something else except the contract plan a trial, though none of them have confidence that it can be made a success. The contracts under the contract system have been expiring during the year, until now they have about 1200 convicts idle, with whom nothing can be done, and they are a heavy burden to the State.

under the piece plan would come in competition with the goods of free labor. The law, however, provides that the goods shall be used, as far as possible, in the other State institutions, and shall not be manufactured in such quantities as will make them burdensome on the market.

The durability of steel rails is discussed by Mr. Webb, of the London and Northwestern Railway, who states that, according to his calculations, 1400 pounds of steel disappear every hour from the track of that company's lines, 1780 miles in length. At first glance this seems a surprising statement, but it is only  $\frac{1}{10}$  ton each hour, or 16.8 tons a day, or 6132 net tons each year, for a line of 1780 miles, having an exceptionally heavy traffic. In length the railways of this

country are 71.3 times that of the London and Northwestern, and at the same rate of destruction by wear on the London and Northwestern is not relatively so great as it may be on many roads in this country.

The decreasing gold production of the world and the increasing consumption is giving rise to uneasiness. The decrease in production has been continuous since 1861. Taking the world's production in periods, in the five years including 1861 it was £139,000,000. In the next five years it dropped to £136,000,000, in 1871 to £128,000,000, in 1876 to £118,000,000, in 1881 to £107,000,000, and in the current five years to 1886, unless the Transvaal or some other mines add considerably to the yield, the amount will have fallen to about £85,000,000, or some £50,000,000 per five years less than was produced 25 years ago.



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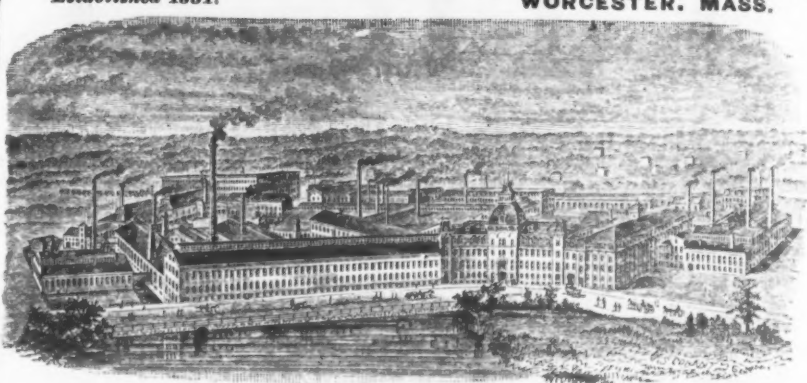
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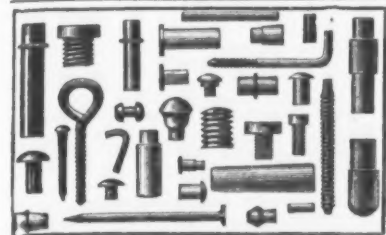


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(Continued from page 1.)

Haswell and Henry Warrington tested the  
Simpson compound engines at the West-Side  
Water Works, Chicago, built by the Quintard  
Iron Works, of New York, and obtained  
a duty of 96,066,800 foot pounds per  
100 pounds of coal.

In May, 1882, Mr. Samuel M. Gray, city  
engineer of Providence, made a six days'  
test of the Corliss engines at the Pottaconset  
Water-Works, in Providence, and obtained  
a duty of 113,271,000 foot-pounds per 100  
pounds of coal, reckoned on the coal con-  
sumed, including the wood used in starting  
fires (estimated at 40 per cent. its weight in  
coal). The average running time for the six  
days was 12 hours 27½ minutes. Deduct-  
ing the coal used for starting and banking  
fires, Mr. Gray estimated the duty at 138,-  
035,000 foot-pounds per 100 pounds of coal  
consumed in running time.

In June, 1883, Mr. Chas. T. Porter made  
a test of the Gaskill compound pumping  
engine, at Saratoga Springs, N. Y. This  
test was of 68 hours' duration, and the duty  
was reported at 106,838,000 foot-pounds for  
each 100 pounds of coal consumed during the  
trial. Mr. Porter also reports that for the  
first 20 hours the apparent duty was 117,-  
580,000 foot-pounds, and for the first 12  
hours an apparent duty of 127,170,000 foot-  
pounds. These results have been seriously  
questioned by many eminent engineers, on  
the ground that the conditions obtaining  
would render so high a duty impracticable.  
The writer, while possessing the utmost con-  
fidence in Mr. Porter's ability and integrity,  
cannot but feel that there is a mistake some-  
where, as the performance too far exceeds  
that of any test reported, made under similar  
conditions.

It may not be amiss, in concluding this  
paper, to sketch rapidly the leading im-  
provements made in pumping machinery  
during the past 40 years, and to summarize  
the characteristics of the best. The most  
important improvement in heavy steam  
pumping machinery has been in compound-  
ing, which has conducted to both economy of  
fuel and smoothness of action, and has re-  
duced to a very great extent wear and tear.  
In the pumps, the substitution of multiple  
valves for the enormous clacks and double,  
treble or four beat valves, formerly used, has  
proved of very great advantage. Improve-  
ment in design in the direction of making  
the parts of greater strength and massive-  
ness, as well as more accessible for examina-  
tion and repair, has been decided. Automatic  
valve gears, controlled by a governor, are  
now largely adopted. High-pressure steam  
and high grades of expansion came in, as a  
matter of course, with compounding. Mr.  
Corliss, in his practice, has reached from 125  
to 130 pounds boiler pressure, expanded 20  
times, while in the new Louisville engine  
it is proposed to work under 140 to 150  
pounds. By far the most important im-  
provement has been in the introduction of  
direct-acting steam pumps, either simple or  
compound. They are an established article  
of manufacture, kept in stock, and made  
with interchangeable parts, to standard jigs  
and templates. Their economy of first cost  
and portability strongly commend them for  
general use.

For small water-works, and for large  
works where the cost of fuel is not too great,  
the compound Worthington duplex engine  
possesses very great advantages, owing to  
its small first cost and good average running  
economy. Including foundations and struc-  
tures, these engines cost less than half that  
of first-class compound beam and fly-wheel  
engines of equal capacity. In fact, at the  
Boston sewage-works, their cost, as esti-  
mated by the writer, does not exceed 40  
per cent., and with cheap coal the saving by  
the high-duty fly-wheel engine will barely  
pay interest on its extra cost. At the Lowell  
Water-Works there is a Simpson compound  
engine, which would probably cost \$75,000  
to duplicate at the present time. By its side  
stands a Worthington duplex, whose cost at  
present prices would not exceed \$25,000.  
The duty of the Simpson engine for 1883,  
on the total coal consumed, was in round  
numbers 78,000,000. The Worthington en-  
gine 61,000,000. The Worthington engine  
would have required 198 tons more coal to  
have done the work actually credited to the  
compound fly-wheel engine, which would  
cost, at \$5 per ton, \$990, which is 1.9 per  
cent. interest on the \$50,000 extra cost of  
the fly-wheel engine. It is fair to state that  
the beam and fly-wheel engine was not  
working up to its full capacity, though  
rather above one-half the same. Doubling  
the work done would require 396 tons more  
coal—worth \$1980—for the duplex engine,  
which is equal to about 3.8 per cent. on the  
extra cost of the fly-wheel engine.

A more important comparison is afforded  
by the West Side Water-Works, at Chicago,  
which have cost, including machinery, build-  
ings and foundations, not far from \$650,000.  
A duplex plant of the same capacity could  
easily be supplied complete for \$300,000.  
The cost of fuel per 1,000,000 gallons  
pumped at the West Side Works in 1882 was  
\$1.90, the amount pumped being 10,000,000-  
000 gallons, with two engines. The four  
engines can pump 20,000,000,000 gallons,  
which, at \$1.90 per million, would cost,  
\$380,000. To pump this quantity of water  
with duplex engines would require not exceed-  
ing one-third more fuel, costing \$12,667.67,  
which is equal to 3.62 per cent. interest on  
extra actual cost of the plant in use. In  
the selection of cases for comparison plants  
which are acknowledged to be first-class  
have been chosen.

From what has been said it will be seen  
that "high duty" may cost too much. Its  
value must be predicated on the saving of  
fuel, as balanced by the interest and depre-  
ciation account of the extra expenditure for  
plant. If the saving tips the scale high duty  
is a good investment; otherwise, not. The  
most successful examples of high-duty pump-  
ing engines, commercially considered, that  
have come under the writer's notice are  
those at Pawtucket and Providence, R. I.,  
and Lynn, Mass., in all of which instances  
comparatively small engines of moderate  
first cost are made to do a large amount of  
work by means of high-pressure steam and  
high piston speed. The key to established  
success seems to be the adoption of these  
two adjuncts of economy.

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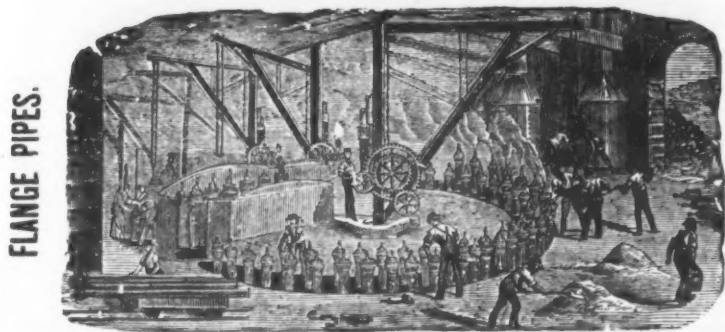
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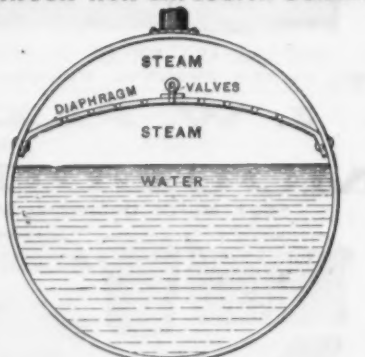
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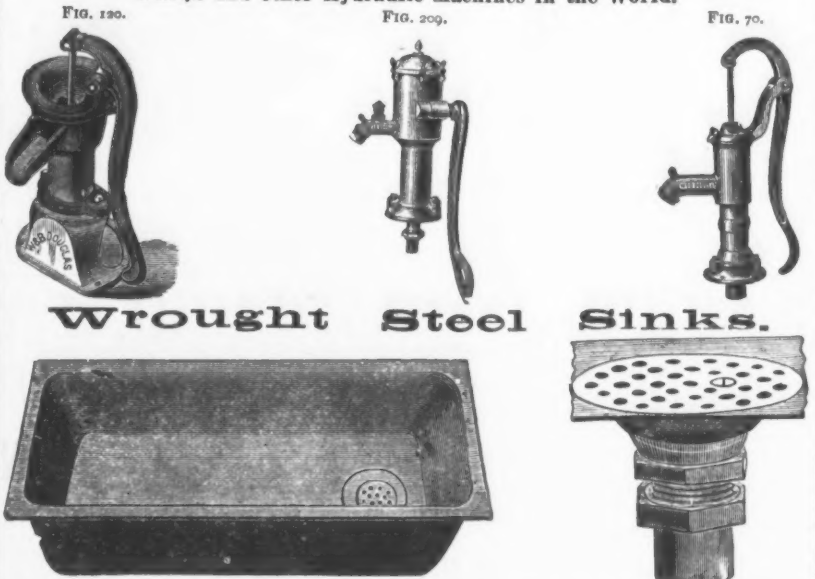
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**NEW PUBLICATIONS.**

THE DISTRIBUTION OF PRODUCTS, OR THE MECHANISM  
AND THE METAPHYSICS OF EXCHANGE. By Edward  
Atkinson. Size 8 x 5 1/2 inches, 303 pages. Pub-  
lished by G. P. Putnam's Sons. Price, \$1.25.

This treatise comprises three separate  
essays, as follows: "What Makes the Rate  
of Wages?" "What is a Bank?" and "The  
Railway, the Farmer and the Public." The  
first, which is by far the most extensive,  
covering nearly 200 pages, is a reprint of  
the address delivered by Mr. Atkinson before  
the British Association for the Advancement  
of Science, at Montreal, last August, to  
which is added a number of notes and  
appendices, the latter being of a statistical  
character. The remaining two essays are  
also reprints of previous writings. Mr. At-  
kinson's answer to the question, What makes  
the rate of wages? will be sufficiently ex-  
plained if we refer to a statement made  
many years ago by the French economist  
Bastiat, which the author makes the text  
of his argument in proving that wages in-  
crease with efficiency of labor. Bastiat  
contends that in proportion to the increase  
of capital the absolute share of the total  
product falling to the capitalist is augmented,  
but his relative share is diminished; while,  
on the contrary, the share of the laborer is  
increased both absolutely and relatively.  
Mr. Atkinson's position is upheld by citing  
the rate of wages paid to labor at different  
times and in different countries. As would  
naturally be supposed, considering the field  
of Mr. Atkinson's especial labors, the cotton  
manufacturing industry is the one drawn on  
for facts and figures. His argument may be  
briefly summarized as follows: The rate of  
wages paid in the cotton mills of Great  
Britain and the New England States has  
been steadily rising since their establish-  
ment in the early part of this century,  
notwithstanding the increasing competi-  
tion and introduction of improved ma-  
chinery, which have lowered the price of  
cotton goods to hardly more than a fraction  
of former figures. For the same object the  
wages of the hand weaver of South Carolina  
and the mill operative of Massachusetts are  
compared, as is also the latter with the  
Asiatic laborer. The result of it all is to  
show that the cheapest labor is not the  
lowest priced, and that a reduction in the  
price of the product does not lessen the  
wages paid to labor, but in reality increases  
them. It is to be regretted that Mr. At-  
kinson did not deal with other industries besides  
cotton manufacturing, as his conclusions  
there would not have been subject to the  
criticism of insufficient data. In one of his  
generalizations the author states that be-  
cause of their immense standing armies the  
Continental States cannot long compete with  
England or America. The burden of these  
armies has, however, existed for some years  
in France and Germany, and France still  
manufactures silk, while England has aban-  
doned the industry and sent many of her  
operatives to seek a living in the protected  
silk mills of this country. Germany, also,  
has not lessened her production of iron and  
steel or woollens, and, in fact, with the  
former successfully competes in the English  
markets, and annually ships large quantities  
of woollen goods to this country. May it  
not be that a wise system of tariff laws has  
aided somewhat in effecting this result, in  
spite of the incubus of the standing armies?  
The essay on banks and banking is a lecture  
delivered a few years ago before the Finance  
Club of Harvard University, and, as the  
title suggests, is an elementary treatise on  
these institutions and the work they per-  
form. The third essay is largely statistical,  
and deals with the present state of affairs  
from a commercial standpoint. The com-  
parisons are both interesting and instructive,  
and will repay careful study, as, with the  
facts and figures given, they serve as valu-  
able data in an analysis of the industrial sit-  
uation in this country.

REPORT OF THE NEW YORK STATE SURVEY FOR  
THE YEAR 1884. Size, 9 x 6 inches, 54 pages.  
pamphlet edition. State Survey Office, Albany.

The report proper by the director, Mr.  
James T. Gardiner, covers but a few pages,  
the major part of the pamphlet being oc-  
cupied by tables compiled from previous sur-  
veys. Though the report of the director is  
brief, it is so by necessity, and the reasons  
for its brevity should merit the attention of  
all who are interested in an accurate and  
complete survey of the State. The obstacle  
in the way of the proper execution of this  
public work is the meagerness of the annual  
appropriation, which has so limited the  
powers of the director that he has been un-  
able to continue the field-work of the sur-  
vey. The report is a very earnest appeal  
for a more adequate appropriation in the  
future, and, considering the excellence and  
value of the work done in the past, it is  
much to be regretted that the financial con-  
dition of the department is not favorable to  
its really efficient continuance.

**Wire Rope for Heavy Cranes.**—An  
overhead traveling crane at the works of  
Messrs. Haniel & Lueg, of Grafenberg,  
near Düsseldorf, capable of lifting with  
double gearing up to 15 tons, gave consider-  
able trouble from frequent breakage of the  
lifting chain, which was mainly due to its  
being wound double upon the drum, which  
had been chosen of too small a diameter.

The danger and expense arising from these  
breakages necessitated an alteration, and  
after lengthy consideration it was decided  
to try wire rope, although no precedent for  
its application to anything like such heavy  
loads could be found. The rope chosen to  
replace the 1 1/4 inch chain was made of  
373 steel wires of 1 millimeter diameter,  
and has a tensile strength of 76 tons per  
square inch. The rope has an outside  
diameter of 1 3/4 inches, and a total breaking  
strain of 146 tons, or nearly ten times its  
working strain. While previously, with the  
chain, the load was carried on a single  
pulley by a double chain, with the rope an  
additional pulley has been added, suspending  
the weight on four ropes; and to partly  
compensate for the reduced speed of lifting,  
the diameter of the rope drum has been  
increased from 17 1/4 inches to 22 1/4 inches.  
The rope now finds ample room on the  
drum, and has, during more than nine  
months, with an average working time of  
16 hours per day, given every satisfaction.

The two pulleys over which it works are  
17 1/4 inches in diameter. The rope was  
made by Messrs. Fulton & Guillaume, of  
Muelheim, and was galvanized to protect it  
against the weather. It cost was one-half  
of that of the chain previously used.

**Breakage of Rolls in Sheet-Iron Mills.**

The very considerable expense or loss  
caused the owners of rolling mills by reason  
of the frequent breakage of rolls has induced  
many mill managers to carefully consider  
the problem for the purpose of ascertaining  
the cause of breakages and reducing the li-  
ability to fracture to the minimum. It would  
appear that much of the difficulty arises  
from incompetency or carelessness on the  
part of the workmen, and accordingly such  
efforts as are made to instruct them are  
likely to prove beneficial. In the mill of the  
Volta Iron Company, Limited, at Apollo,  
Pa., several breakages have occurred re-  
cently, and, while the general percentage of  
fractures perhaps is no greater in this con-  
cern than is ordinarily experienced in sheet-  
iron mills, several of the breakages have  
been of a character which, in the estimation  
of the managers, might have been avoided by  
due attention to simple principles upon the  
part of the workmen. In an effort to remedy  
this difficulty and to avoid future accidents,  
a printed circular has been recently prepared  
by Mr. James Mallon, the manager of the  
mills referred to, and is prominently posted  
in the works. It is entitled, "Causes of  
Breakage, and How to Guard Against the  
Same." In the course of the circular the  
following directions appear:

"In starting the mill in cold weather, see  
that the fire is out of the rolls before com-  
mencing to work on them; then see if the  
mill is in line with the balance of the train;  
if it is not in line stop until it is made right.  
In warming up the mill do not hurry, but  
allow time for the heat to penetrate the  
rolls. When the rolls are in shape for wide  
iron, commence on it, and, if from any cause  
the mill should stop, charge in the pair fur-  
nace some narrow iron; get it thoroughly  
heated and notice in what shape the rolls are  
before again commencing on wide iron. Be  
sure at all times to see that the pair heater  
has the iron heated thoroughly, and under  
no circumstances put a piece in the rolls that  
is not thoroughly heated. At the doubling  
of pairs on finishing rolls is the time when  
most rolls are broken; accordingly at this  
point the screws should be well slackened,  
in order to give only a slight pressure on the  
iron. If from any cause the pieces should  
become chilled, return them to the furnace  
before doubling. The time when pair heat-  
ers should be most careful about heating is  
after the changing of turns, or when they  
clean the fires. The iron is apt to have a  
wash heat at that time—that is, hot on the  
outside, but cold in the middle."

It is the belief of Mr. Mallon that careful  
attention to these simple directions upon the  
part of the rollers will have the effect of  
greatly reducing the number of breakages  
which occur.

**Contracts of Married Women.**

Considerable doubt is frequently enter-  
tained and expressed as to the validity of  
contracts of married women, and there is a  
vague feeling that it is not perfectly safe to  
enter into such contracts. This uncertainty  
arises from the former laws in regard to  
femmes covert, as they were termed, by which  
it was laid down that their existence was  
merged in that of their husbands, and that  
they could make no contracts except through  
him. In other words, husband and wife  
were one and the husband was that one.  
In view of the large number of married  
women who do business on their own ac-  
count, and the number is constantly increas-  
ing, the matter becomes very important.  
To remove any uneasiness, it may be stated  
that within the last 30 years laws have been  
passed in all the States by which married  
women who engage in trade and carry on a  
separate business are bound by their con-  
tracts in relation to that business as much as  
a man or as if they were unmarried.

In some contracts they make their hus-  
bands are also bound. There are contracts  
for necessities, including dress, groceries,  
&c., for household use. This is so, even if  
the wife lives apart from her husband or if  
he refuses to support her and pay the bills,  
provided, of course, that they are not di-  
vorced. Her husband is bound to support  
her, and no notice in a newspaper or in any  
other way to the effect that he refuses to be  
bound by her contracts can relieve him from  
this liability. The tradesman is perfectly  
safe, if the husband has property, in giving  
her credit under these circumstances, even  
if he knows the facts. He can collect the  
money either of her or of her husband. It  
is always better, in case of a note or draft  
given by a married woman, or any contract,  
in fact, made by her, to use some form of  
words such as these: "I hereby charge my  
separate estate for the payment of this  
note," &c. This used to be necessary in  
New York, but a statute of 1884 renders it  
non-essential now. It is expedient, how-  
ever, for the purpose of avoiding doubt, to  
still employ the form.

**Country Labor in English Towns.**

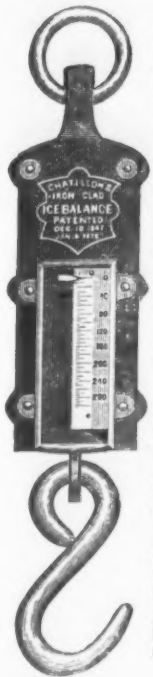
The London Times makes the following  
observations on an evil existing in England,  
which are to a remarkable extent true for  
this country: "There is trade depression,  
we know, but it has been felt more by the  
employers than by the laboring class. With  
more justice the complaint been made  
that men from the country are crowding into  
our towns, and that they can find nothing to  
do on their arrival. The surprise is that  
they can expect anything else. They are in  
search of what they are not fitted for, and  
which would be of little service to them if  
they could get it. A countryman does not  
bring with him the kind of skill which town  
employers demand. He can go to work for  
which no special training is needed, and as  
there is seldom a superfluity of this he must  
expect to be out of work during a large  
part of his time. His case is a hard one, but  
it is one for which Mr. Henry George can  
propose no cure. To set a starving man  
down on an acre of land and to bid him







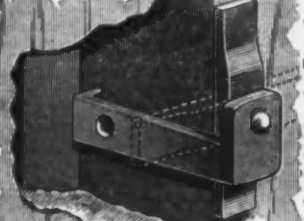
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 Send for Illustrated Price List.



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 IS THE MOST PERFECT NOVELTY OUT.  
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 Send for prices.

**LITTLE GIANT DOOR FASTENER.**  
 The best article in use for a pocket door fastener. It is a simple contrivance, instantly adjusted or removed from a door.

  
 A Capital thing for Travelers.  
 or enclose a cent for a sample to  
 Bay State Novelty Co., 17 Herne St.,  
 Worcester, Mass.

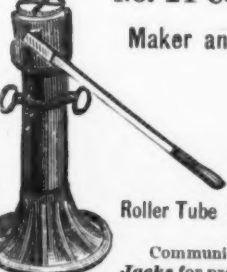
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**GEORGE W. BRUCE,**  
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 Hilling, Bog and Handled  
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 and Grab, and a variety  
 of other kinds for Home  
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 Manufacturers of  
 M. E. Track Scales, Hay Scales, Coal  
 Scales, Grain Scales, Platform  
 Scales, Counter Scales, &c.  
 Send for price list, stating what you want.

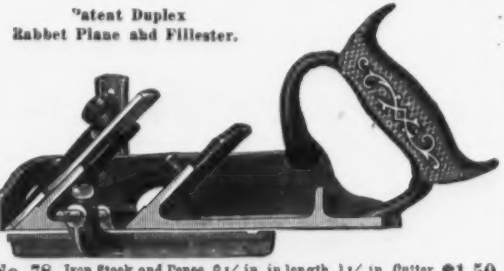
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**The Celebrated Patent Air Space Covering**  
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 ing, &c.  
  
 Asbestos Materials, Fibre, Millboard Packing and Cement.  
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 OFFICES:  
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**The Essex Horse Nails**  
 Are drawn from the best Swedes Iron Rods only. They are hot forged and cold-pointed,  
 rendering them tough, stiff and easy driving, and are warranted  
**FIRST-CLASS IN EVERY RESPECT.**  
 All Nails branded "ESSEX" are Fully Guaranteed.

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 No. 78, Iron Stock and Fence, 8 1/2 in. in length, 1 1/2 in. Cutter, \$1.50.

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 Dealers in Steel, Copper, Brass, Tin Plated and Copper Plated Wire,  
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**PATENT SPOOL WIRE FOR THE RETAIL HARDWARE TRADE.**  
 Dealers who handle it do away with the **Broken Bundle Business** and sell small quanti-  
 ties by the spool only. It is a convenience for both dealer and consumer. It is **Shellac-Coated**  
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 like spool cotton on **quarter**  
**Pound, Half Pound and**  
**One Pound** Spools, one  
 dozen spools in a box.  
 Our spooled **Hair Wire** is  
 the best in the market.  
 FOR SALE TO THE TRADE BY  
**MALIN & CO.,**  
 CLEVELAND, O.,  
 AND BY  
**Hardware Jobbers Everywhere.**  
 SEND FOR ILLUSTRATED PRICE LIST.  
 SPECIAL WIRES FOR MANUFACTURING PURPOSES ON ANY SIZE OF SPOOL.  
**JOHN WALES & CO.,**  
 Eastern Agents. 239 and 241 Franklin St.  
 BOSTON, MASS.  
 Manufacturers and the Trade are warned not to infringe on our patent, No. 294,740, either by manufacturing  
 or selling.

cultivate it and live upon it would be sheer  
 mockery. The revision of goods must go  
 a good deal further before his land could  
 become of use to him, and he would be a  
 great deal worse off under the new system  
 than he is now, even at starvation wages, for  
 he would have no chance even of these."

**English Letter.**

(From Our Regular Correspondent.)  
 LONDON, February 9, 1885.

THE WEEK  
 has been a quiet one, and it has presented  
 no commercial or industrial developments  
 of importance. As I remark lower down,  
 everything is dull and lethargic, and there  
 are really few features wherewith to furnish  
 an interesting letter for your readers.  
 The saddest news of the week has been the  
 intelligence that poor Sidney Gilchrist  
 Thomas died in Paris, on Sunday, February  
 1. We who knew him intimately were only  
 too well aware that the end must come, but  
 even that knowledge of the inevitable did  
 not prevent the fatal news from shocking all  
 to whom it came. You, who also knew him  
 personally, would also be shocked, I have no  
 doubt. He died in his 35th year—he would  
 have been 35 in a few months—so that he  
 has literally been cut off in the very prime  
 of life, just at an epoch when most men are  
 busiest, and when the skill and industry of  
 the earlier period of life is, or ought to be,  
 bearing fruit. In one sense poor Thomas  
 was older than his years, and those who  
 scanned his thoughtful, dreamy face might  
 well have believed him much older than he  
 really was. I need not attempt to give  
 you any details of his biography, for you  
 will be able to obtain an abundance  
 of such particulars from other sources,  
 but I may, I hope, place on record my sense  
 of the great loss metallurgical science has  
 sustained by his death. Like Bessemer, his  
 great prototype, Thomas was essentially an  
 inventor. He virtually gave his life to de-  
 phosphorization, yet he never desisted from  
 investigating, and even when ill last winter,  
 in Algeria, he was in constant communica-  
 tion with the Patent Office here, and carried  
 on experiments on the northern shore of  
 Africa as philosophically as in London. One  
 invention he had pushed very forward, and  
 I am told that it had been tried with success  
 here for six months. I am not at liberty to  
 state its nature more specifically, but I am  
 told that under its operation what is now  
 esteemed a principal production would have  
 been merely a by-product. Perhaps this  
 invention will now be carried on by some-  
 body else. Thomas always acted as his own  
 patent agent—that is to say, he drew up his  
 own specifications and had them revised by  
 a qualified person. The leader of the bar in  
 patent cases had a perpetual retainer from  
 him—a proof of considerable foresight. In  
 Germany, on one occasion, he appeared in  
 court in person, argued and won his case.  
 His sister was his amanuensis, and she, with  
 his mother, was with him to the last. He  
 had often expressed a wish to be buried in  
 or near Paris, and he was interred, there-  
 fore, on Tuesday, February 3, in the ceme-  
 tery at Passy, a pleasant suburb of the  
 French capital. I don't think Thomas ever  
 made a personal enemy; if so, certainly I  
 never heard of it.

**THE IRON MARKET**

has not improved since the writing of my  
 last report; indeed, the stagnation of busi-  
 ness in general is so marked that there are  
 very few features in any branch of the iron  
 trade worthy of special note. The keenness  
 of competition has not been diminished, but  
 rather intensified in some departments, owing  
 to the relative scarcity of orders, aided by  
 the efforts which are being made by some of  
 the stronger concerns to crush their weaker  
 rivals out of existence. In times such as  
 these the weight of capital must tell in the  
 long run, and the advantages conferred  
 thereby are all the more readily reaped if  
 there are also manufacturing advantages or  
 special facilities for effecting foreign and  
 coastwise shipments. The race, in fact, is  
 no longer a question of speed, but of endurance,  
 and the struggle is so determined  
 that there can be little doubt that a much  
 longer continuance of the depression will  
 bring about further withdrawals, and so lead  
 to a diminished production. Whether in all  
 cases this result would be beneficial would  
 not be seen at once; but it is probable that  
 in some cases the wiser way would be to  
 enter into a mutual arrangement for the  
 protection of the particular industry con-  
 cerned. In the galvanized-iron trade, for  
 instance, the prime cause of the present dis-  
 organized state of affairs is understood to be  
 the rivalry between the two large houses.  
 These concerns are said to be cutting prices  
 severely in order to secure business, all the  
 other houses in the trade alleging that they  
 would be willing to enter into an arrange-  
 ment for establishing a minimum price, and,  
 if deemed advisable, for limiting the output.  
 At present any such combination appears to  
 be a remote contingency, and that will be  
 the case until the two houses in question  
 have grown tired of the struggle in which  
 they are now so actively engaged.

At Glasgow the week has been a quiet  
 one, and only a limited amount of business  
 has been done in warrants, despite the lower  
 values, which closed at 41 3/4 p. ton.  
 Scotch makers' brands are nominally un-  
 changed, but in some cases are 3d. @ 6d.  
 p. ton easier on the week. Shipments con-  
 tinue poor, and stocks are very large, so  
 that the outlook is not bright. At Middles-  
 boro' the market for pig iron has remained  
 dull, with No. 3 at 35/ @ 35 1/3 in makers'  
 hands, but with rumors of sales by mer-  
 chants at 34/9 @ 35/ p. ton. The official  
 returns for the month of January are not  
 likely to strengthen values, inasmuch as they  
 show that stocks increased by 32,000 tons.  
 Foreign shipments are in arrears, but a  
 good deal of iron is being sent to Scot-  
 land, thereby keeping the returns in that  
 respect fairly up to the mark.  
 Up to the present the final decision  
 of the ironmasters of the Cleveland  
 district on the subject of restriction has not  
 transpired, but it is believed that an addi-  
 tional number of furnaces will be suspended.  
 The present arrangement, it will be remem-

bered, expires at the end of February. On  
 the West Coast hematites are a shade easier,  
 but the nominal quotation for mixed lots in  
 usual proportions is still about 44/ p. ton.  
 Sales are on a moderate scale, but do not ab-  
 sorb the entire production. In the other  
 smelting districts affairs are very quiet,  
 the quotations of a few weeks ago being  
 "shaded," in order to effect sales. Heavy  
 finished iron is no better in respect of ship  
 plates, but at two or three of the large  
 works in Derbyshire, Staffordshire, &c.,  
 there is a good deal of bridgework and other  
 structural iron in hand. Galvanized iron is  
 demoralized, and some of the makers are  
 pressing hard for orders, which are difficult  
 to obtain, many of the merchants having  
 supplied themselves for some time ahead.  
 Fencing wire is dull and neglected, but some  
 other kinds of wire are in fair request. Or-  
 dinary finished iron is still quiet, although  
 there are better inquiries in some quarters  
 for bars. Quotations are so irregular that  
 they afford no real criterion of actual figures.  
 Marked bars, however, are 47 @ 47 1/2 p. ton;  
 medium, 46 @ 46 1/2 p. ton; fair ordinary, 45,  
 12/6 @ 46; common, 45, 5/ @ 45 1/2 p. ton;  
 and ordinary Welsh, 44, 15/ @ 45 p. ton.  
 For sheets there is a fair inquiry,  
 mostly for working-up sorts. Hoops,  
 angles and strips are in moderate  
 request only. Old materials are neglected  
 at about the following rates, which are quoted  
 by F. Pitts & Co., London: Old D. H. iron  
 rails, 2s. 15/; No. 1 heavy wrought scrap,  
 2s. 2/6; old boiler tubes, 2s. 7/6, and old  
 cast iron, 2s @ 2s 2/ p. ton, all f.o.b. Lon-  
 don or other good British port, net cash.

Freights are nominal to the States both  
 from Glasgow and Liverpool, while from  
 London, Cardiff, &c., they are irregular and  
 low. With reference to the British Channel  
 ports Edwardes, Robertson & Co., Cardiff,  
 advise me: "The exports from this channel  
 to the United States and Canada during the  
 month of January have been nearly confined  
 to tin plates, of which comparatively a fair  
 quantity has gone forward for the first month  
 in the year. The low rates of freight cur-  
 rent during the latter part of the past year  
 still continue, and tonnage is easily obtain-  
 able at 7/6 @ 8/." Steel is without change  
 to note, but there is still only a limited  
 amount of employment at many of the Shef-  
 field works. Elsewhere the Bessemer con-  
 cerns are doing a tolerable turnover, and  
 the Siemens establishments are steadily oc-  
 cupied. Steel rails are unchanged at late  
 rates, and no particular flow of new orders  
 is to be reported.

**SCOTCH PIG IRON**

has been easier on the week as regards  
 warrants, in which there is only a limited  
 amount of business, and that on terms favor-  
 able to the "bears," whose views and opera-  
 tions are helped by the Scotch statisticians as  
 well as by the heavy importations of Cleve-  
 land pig iron. The reason for these latter is  
 not clear to the general public, but a key is  
 available to those whose experience is not of  
 yesterday. There are now 93 furnaces in  
 blast in Scotland, against 97 a year ago. In  
 Connal's stores there are 530,876 tons, against  
 592,007 tons this date 1884. The increase  
 last week was 1478 tons. Shipments to date  
 are 7239 tons in arrears, while the imports of  
 Middlesboro' pig have increased by 15,785  
 tons.

**MIDDLESBORO' PIG IRON**

is dull and flat, the market having been fur-  
 ther depressed by the unfavorable returns  
 (appended) of the ironmasters for the month  
 of January. For G. M. B., the current  
 rates, f.o.b. makers' wharves in the Tees,  
 net cash, are, nominally, as under:  
 No. 1 Foundry..... 38/ Mottled..... 33/3  
 " 2 "..... 36/6 White..... 32/9  
 " 3 "..... 35/ Refined Metal..... 32/7  
 " 4 "..... 34/3 Kettlehead..... 31/6  
 " 4 Forge..... 33/9 Cinder..... 31/6  
 The official returns for January of the  
 Cleveland Iron Masters' Association give the  
 make of pig 202,225 tons, a slight decrease  
 on the previous month. The total stocks are  
 371,417 tons, an increase of 32,728 tons.  
 The shipments were 59,148 tons, against 63,  
 562 in December.

**THE BOARD OF TRADE RETURNS**

for January, issued to-day, show that the  
 total value of the imports was £36,049,005,  
 against £35,645,221 in January, 1884. The  
 increase was chiefly in respect of raw mate-  
 rials for the textile trades. The aggregate  
 value of the exports was £18,109,525, as  
 compared with £19,352,541 in the same  
 month of last year. The decrease in metals  
 was £780,073, and in machinery or mill-  
 work of £254,566.

**DECLINE OF PRODUCTION IN THE IRON TRADE.**

The secretary of the British Iron Trade  
 Association has just issued a statement  
 showing the production of pig iron in the  
 United Kingdom during the year 1884, as  
 ascertained by returns received from all the  
 iron-making works of the country. The  
 statistics show that during 1884 the produc-  
 tion of pig iron throughout the country as a  
 whole was 7,528,000 tons, being a decline of  
 961,000 tons, or 11% on the quantity made  
 in the preceding year. This is the largest  
 decline that has ever occurred in any one  
 year in the history of the iron trade. Of  
 the total amount of decrease 417,000 tons  
 occurred in Cleveland and Scotland. The  
 actual consumption of pig iron in the United  
 Kingdom in 1884 was 7,383,000 tons, being  
 a decrease of 1,065,000 tons on the con-  
 sumption of 1883. The stocks of pig iron  
 unsold in the United Kingdom at the end of  
 1884 were larger by 140,000 tons than those  
 held at the end of the preceding year. The  
 number of furnaces in blast throughout the  
 country at the end of 1884 was only  
 475, which is a decrease of 64 on the number  
 in blast during the preceding year. Mr.  
 Jean's report contains several other items of  
 information that are of considerable impor-  
 tance to the iron trade, bearing upon the sub-  
 ject of the coal used, which has declined  
 from 2 1/2 tons in 1874 to 2 tons in 1883 per ton  
 of pig iron made; as to the consumption of  
 ore per ton of pig iron, made which is 2.3 tons  
 in the United Kingdom, against 1.9 in the  
 United States and 2.6 tons in Germany; and  
 as to the greatest annual average production  
 of pig iron per furnace in different countries,  
 showing that the greatest annual average  
 production per furnace is obtained in Bel-  
 gium, the second in the United Kingdom,  
 the third in Germany, and the fourth in the  
 United States.



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NOW, This is to Witness, that, in consideration of the forbearance of the Representatives of the said John Wilson to sue me for damages for the wrong aforesaid, I do hereby undertake and agree,  
FIRST, to surrender and deliver to the Attorneys for the said John Wilson, all knives now on hand, and in my possession, or under my control, bearing the said imitation trade-mark, and  
SECOND, I further undertake and agree to and with the said John Wilson, and his legal representatives, not to manufacture or sell, or cause to be manufactured or sold, at any time in the future, Knives or other Cutlery, bearing his trade-mark aforesaid, or any imitation or simulation thereof. IN WITNESS WHEREOF, I have hereunto set my hand and seal at West Mansfield, aforesaid, this thirty-first day of May, 1885.

WITNESSES:  
E. M. REED,  
(Attorney for Defendant.)

G. A. ROBINSON (L.S.)

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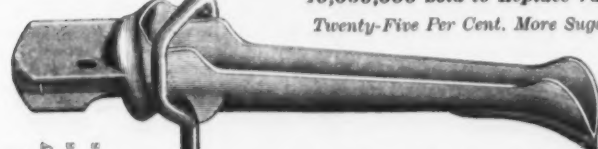
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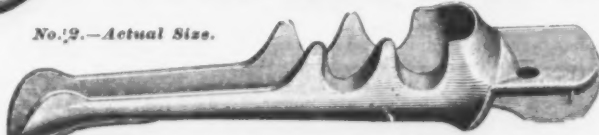


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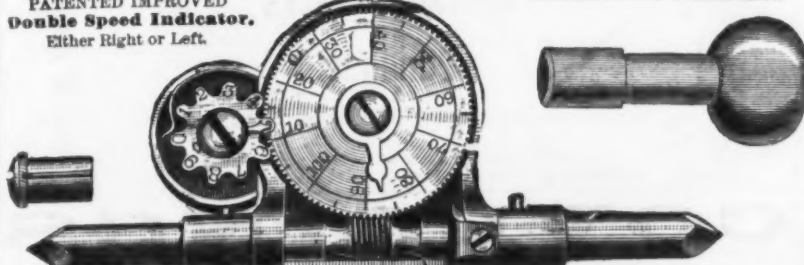
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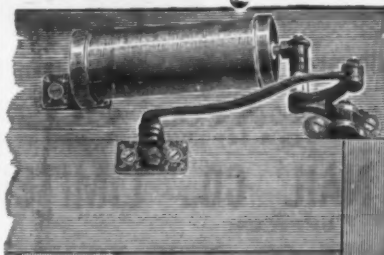


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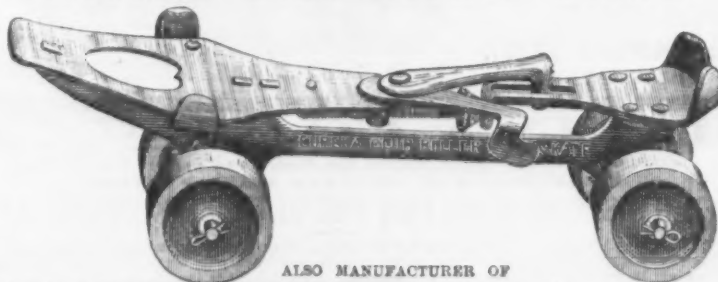
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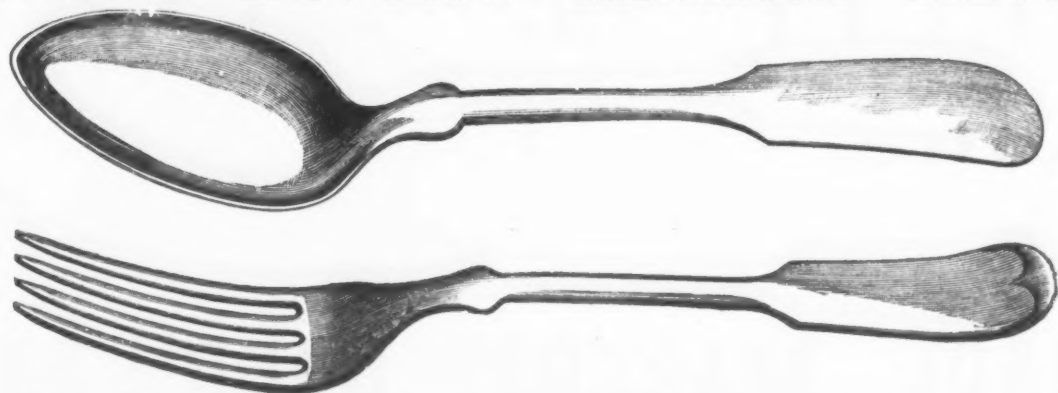
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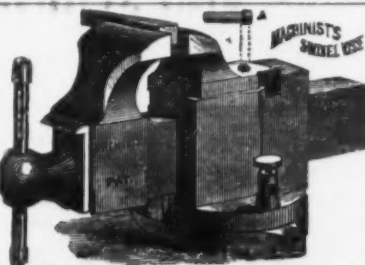
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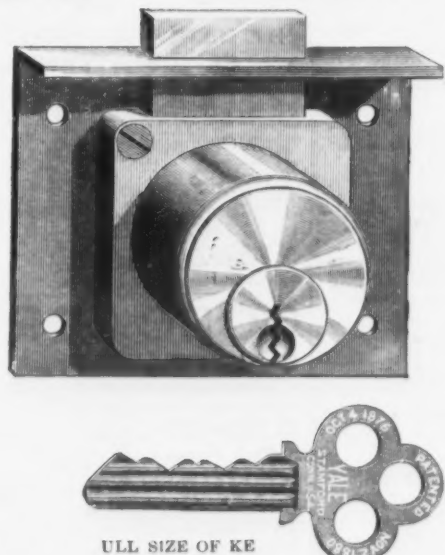
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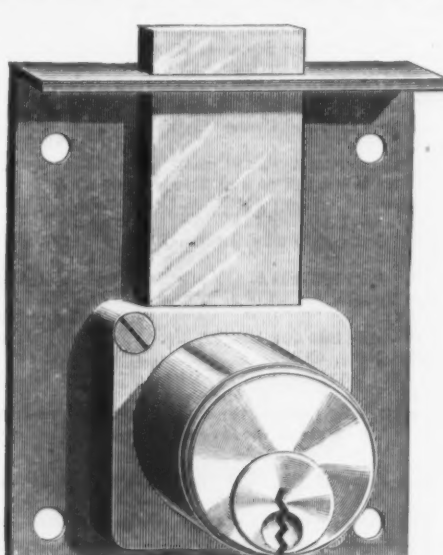
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## The Conditions of Success in Manufacturing.

In his address from the chair at the opening of the annual meeting of the American Institute of Mining Engineers, in New York, on February 17, Mr. James C. Bayles, president, expressed some views with regard to the conditions of success in manufacturing which are different from those usually held by writers on economic subjects. We quote as follows:

The subject I shall have pleasure in considering this evening is, briefly, whether the conditions of success in manufacturing are so arbitrary and difficult of attainment as to discourage young men from engaging in competition with the vast aggregations of capital that are popularly supposed to be fast acquiring a monopoly of profitable production.

A thoughtful writer in a recent issue of a leading English magazine, in an article discussing the increasing concentration of industry, presents some statistics that are intended to show that steam has extinguished the handicrafts, and that, as steam-power is most economically employed on the largest possible scale, it is rapidly and inevitably leading to a monopoly of manufacturing by large establishments, and the extinction, one by one, of those that are small. The situation in Great Britain is represented as follows: "Trade after trade is monopolized, not necessarily by large capitalists, but by great capitals. In every trade the standard of necessary size, the minimum establishment that can hold its own in competition, is constantly and rapidly raised. The little men are ground out, and the littleness that dooms men to destruction waxes year by year. Of the cotton mills of the last century, a few here and there are standing, saved by local or other accidents, while their rivals have either grown to gigantic size or fallen into ruin. The survivors, with steam substituted for water-power, with machinery twice or thrice renewed, are worked while they pay 1/2 or 1/3 per cent. on their cost. The case of other textile manufactures is the same, or stronger still. Steel and iron are yet more completely the monopoly of gigantic plants. The chemical trade was for a long time open to men of very moderate means. Recent inventions threaten to turn the plant that has cost millions to waste brick and old lead. Already nothing but a trade agreement, temporary in its nature, has prevented the closing of half the factories of St. Helen's and Widnes, and the utter ruin of all the smaller owners. Every year the same thing happens in one or another of our minor industries. Retail trade was, until lately, the recourse of men whose character, skill, thrift and ambition won credit and enabled them to dispense with large capital. The larger branches of retail trade are already superseded by co-operation, or monopolized more and more generally by vast skillfully organized establishments with which the small capitalist, however diligent, honest and able, cannot possibly compete. They can sell at little over wholesale prices, while giving their customers all and more than all the conveniences proffered by the ordinary tradesman." A gloomy picture, certainly, but possibly somewhat overdrawn.

In this country it is not unusual to hear similar statements from those who study great social and industrial problems from their surface indications only. We hear them on all sides as furnishing an excuse for the lack of success that attends so many industrial ventures, but their insufficiency as an explanation of failure is found in the fact that here, as elsewhere, industrial greatness is usually, if not always, the result of development from small beginnings. The investment of capital in manufacturing enterprises that are to be great from the outset is always perilous and often disastrous to the investors. Among those that start small, the law of the "survival of the fittest" operates in a perfectly natural and proper way. We can see the reason for what happens, whether the happening be success or failure. With conspicuous justice, "the many fail, the one succeeds." To those enterprises that succeed, capital is naturally attracted, while from those that do not succeed it is naturally withdrawn in search of safer and more profitable investment. The successful establishments are extended and enlarged, and become corporations of overshadowing importance; those less successful barely hold their own or gradually fall back, changing hands from time to time, and finally relapsing into permanent idleness. This process is constantly going on, for the reason that, with the ever-changing conditions of business success, the establishments that become great under one management may decline or collapse under another.

Industrial greatness would perhaps be a function of capital alone if capital were something outside of business, always available for use and self-renewing. But capital represented by land, buildings, machinery, patterns, &c., may become like a millstone around the neck of a corporation, and often does. The management that made a manufacturing establishment great rarely suffices to keep it at the head, even during the life of the generation that saw it begun. Ordinarily, the longer it lives the more dead weight it has to carry, and the instances are comparatively few in the world's industrial history in which a plant adapted to supply the wants of one generation is suited to meet the wants of that which succeeds it. For this reason the field is always open to skill, enterprise and courage.

I have been led to these reflections by a careful and more or less thorough study of the conditions of success in the manufacture of iron and steel. The history of the iron industry of this country shows most strikingly upon how many conditions other than the extent and temporary importance of iron-making plants is success dependent. It is unnecessary to examine its statistics in detail or in general further than to note that they show a gradual and fairly steady westward progress of the wave of iron production. It is not long since the conditions of success in iron-making were found in small furnaces planted in the woods of New England and the Middle States, and dependent for an outlet upon the haulage of their product over corduroy or country roads; and in rolling mills planted on streams affording

ample water-power to drive their rolls. The census tabulations for 1880 place the geographical center of iron production in Western Pennsylvania beyond the Alleghany range, and the development in the South since the census was compiled would probably move the point as far West and South as Pittsburgh. The shifting of the geographical center of production means a gradual but irresistible change in the conditions of success in iron-making; and as offsets to such changes, the prestige of former greatness and controlling industrial importance count for very little. That the Northeast is not keeping up its proportion of the pig-iron production of the country is clearly shown by the statistics of the trade. The natural territorial sources of pig-iron supply for the Northeast are the New England States, New York, New Jersey and the Lehigh Valley of Pennsylvania. That these sources have not made much progress in production in the past 10 years is indicated by the fact that within that time their proportion of the total pig-iron production of the country has declined from 30 to about 20 per cent. Southern and Western irons have come in to supply the increased consumption of the Northeast, and they are to-day crowding our markets, while so many of our local furnaces stand idle, unable to produce at present prices. These facts are significant as showing that the large capitals of the old-established iron works of the Northeastern States do not give them any conspicuous advantage in competition as against better natural advantages elsewhere offered. In fact, their large capitals are the heaviest burdens they are staggering under.

The steel industry is still comparatively a new one in this country, and we have as yet witnessed no great change in its geographical center of production. Even the youngest in our membership can remember - not its beginning, perhaps, but its initial triumphs in the production of grades of steel that could safely challenge comparison with foreign makes. But during this brief period we have seen some surprising happenings. Small capitals have grown, and large capitals have in some instances shrunk to nothing. Great establishments have been organized that, because of their greatness, have fallen to pieces almost before they began production, and small beginnings, judiciously planned and managed, have been the foundations of brilliant industrial and financial successes. The changes of the next 20 years, though impossible of prediction, are likely to be quite as important as those of the past 20 years. In the steel-rail industry we have witnessed a marked change that is probably but the prelude to one still more marked. Its beginnings are easily recalled and its history is familiar. Certainly it shows that courage and enterprise often count for more than large capital and the prestige of past success. No industry has seemed to be so completely a monopoly of large capitals as steel rail making. The bigger the converters and the more of them the better seemed the chances of success. Every thing else needed to be big in proportion, and the more tons of rails a mill could turn out in a year the greater the apparent security of the investment. It looks now as if the small plant was more desirable than the large one, and 4-ton converters seem to be more convenient and desirable property than 15-ton converters. During the next few years we are likely to see Bessemer mills built and run as departments of works of medium size, as rolling-mills might have blast-furnaces connected with them; and there are doubtless some large Bessemer plants representing an enormous investment that could be bought for a very small part of their original cost, but which few shrewd business would care to take as a gift on the condition of keeping them in operation for a term of years.

But if no one need be deterred from entering iron and steel making by the apparent impregnability of the great capitals that stand like fortifications along the highways of industrial enterprise, still less need he fear those gigantic organizations effected by combination and consolidation. More often than otherwise these consolidations are brought about in the hope of shoring up enterprises that can not stand alone. They are very formidable on paper, but they are apt to fall to pieces suddenly through the weakness of their component parts. We have watched the formation of several such consolidations in the iron trade; but in every case they have failed to accomplish the object for which they were formed, and sooner or later they have gone the way of all bubbles that owe their expansion to the elasticity of an extremely tenuous film.

In other and allied industries we find reason to doubt that, in this country at least, manufacturing is in any sense the monopoly of large capital. Those who own or control vast establishments are likely to insist that, through the advantages of larger capital and the control of plant in which every appliance for economizing the cost of making and handling has been provided, they can make and sell cheaper than their small competitors, for the reason that, while their cost per ton or per piece is less than it would be with less perfect appliances, they have an important advantage in the fact that their incidental expenses, being divided into a larger product, show a less percentage per ton or per piece than in the case of the small factory. Those who lead the trade consequently affect to believe that the tendency is to make the great concerns greater and the small concerns smaller and less numerous; that within a few years production and distribution will be controlled by a few immense corporations, and that the smaller manufacturers, unable to compete, will give up the unequal contest. On the other hand, the small manufacturers are by no means ready to be convinced, by argument or statistics, that their position is hopeless. Primarily, they do not admit that the great establishments are, by reason of their greatness, able to produce on a large scale cheaper than is possible on a small scale. They claim that there always exist in large establishments conditions involving costs that cannot be taken into account in an estimate, but that appear in the annual balance-sheets. There is too much subdivision of responsibility, a less close and intelligent supervision of details, more small leaks, and a greater proportion of waste. The small manufacturer who wanders about the



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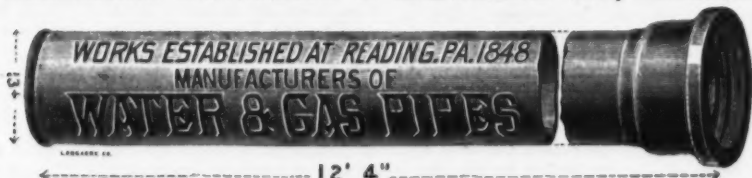
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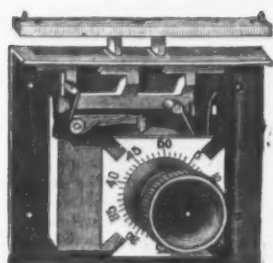
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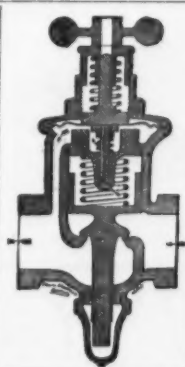
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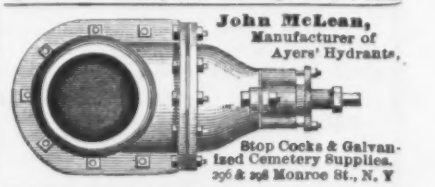
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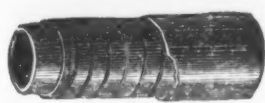
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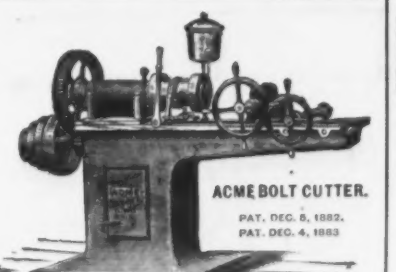
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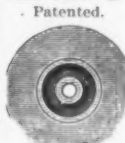
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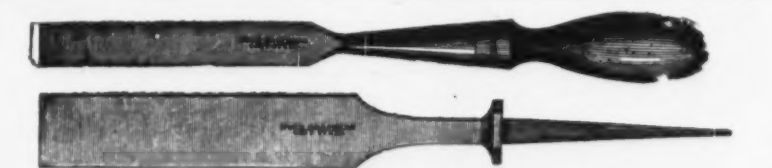
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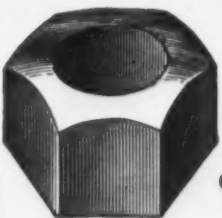
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establishment of his great competitor usually thinks he recognizes a disregard of that which, in his case, would make all the difference between profit and loss; and while he cannot fail to notice that there are advantages in a large plant that a small one does not possess, he also sees disadvantages in a business that has so far outgrown the supervision of the proprietor that he is at all times dependent on the skill and fidelity of subordinates, who, even if skillful and faithful, do not always work together so harmoniously as to insure the best results.

It is unnecessary to take sides in this discussion, but, without doing so, I may say that, in assuming that only the great capitals can safely meet the increasingly sharp competition of trade, we are in danger of mistaking the effect for the cause, and so hopelessly confuse our argument. It is sufficient for our present purpose, however, to accept the fact that the greatness of the now great industrial establishments does not necessarily bar the way to progress for those that are now small. The chances of 20 years are rather in favor of what are now small beginnings, provided they are headed in the right directions, than of the great enterprises that now seem to overshadow their modest competitors. There is a reason for this. A successful manufacturing business is likely in a quarter of a century to outgrow the conditions that made it successful. When that died, in this city, some years ago, a merchant whose name had come to be almost a synonym for business success and uncounted wealth, a great many surprising facts came to light. In the complex structure of his vast business there were hundreds of rotten timbers. Carried from year to year by the sheer force of an enormous capital, it might have gone on for years longer, but it was in no sense profitable as a business. It had millions of dollars' worth of mill property that had not turned a wheel for years, and competition had tapped it at so many points that it was honeycombed through and through. Those who are old in business experience can recall a score of instances in which the great establishments of the last generation have disappeared in this.

The facts that I have presented are significant merely as so many emphatic contradictions of the popular impression that the tendency is toward a monopoly of manufacturing by great corporations. It is toward a monopoly in the hands of those who can manufacture the best product at least cost, and this is not always true of the largest concerns. There is always room enough in the forest for young trees to grow. Those that have already grown may lock their branches overhead, but somehow the saplings manage to get their share of light and heat and nutriment from the soil. So it is in the manufacturing industries. Those that take root and begin to grow adapt themselves to the conditions that surround them. As their plant increases, it constantly gains in productiveness. Its development is along the lines of natural progress. Each generation has its own development, and its legacy to the future coming generations will necessarily discard in great part. There is just as good a chance to-day for skill, courage and enterprise as there ever was. Machinery has destroyed the handicrafts to a great extent, but it has given each man muscles of iron and fingers of steel with which to work. The conditions have changed, but the opportunities have broadened and diversified.

Within a few years we have had a great development in this country of facilities for technical education. Large classes are annually graduated, and every year a considerable number of young men, peculiarly well equipped for industrial success, are called upon to decide what they will do in life. That only a small proportion engage in pursuits in which their education gives them an important advantage over young men who have spent in business the years they have passed in college is unfortunately true. Having been brought a great deal in contact with graduates of our technical schools, I know that they are all more or less impressed with the idea that the time is past when a young man without capital or influence has any chance of success in applying his knowledge practically in manufacturing. They seek employment in the service of the great concerns, and generally fail to get it for the reason that very few capitalists care to provide these boys facilities for a post-graduate course. They seek employment as assistants to the management of smaller works; but their qualifications are not usually of a kind much in demand, and they are not, as a rule, willing to accept what they can get. At last, discouraged and disheartened, they make up their minds that no way of utilizing their knowledge is open to them, and they are very apt to go into trade with regrets that they had not spent in gaining business experience the time they feel they have wasted in college. Their decision is in most cases based upon an entirely erroneous conception of the opportunities that are open to clever and ambitious young men in the manufacturing industries. In these better and easier than in any other fields of usefulness can a young man who has the elements of success in him afford to be indifferent to his lack of capital and influence. It devolves upon the young engineer who has such education as the schools can give him to select the line of work most congenial to his taste. If he has no preference, he can find cause for congratulation in the fact that one line is as good as another in the average of years. How he begins is a matter of no consequence; but the less he depends upon his academic degree, and the more he relies upon his industry and capacity to learn, the better his chances of starting right and making a steady upward progress. There is always a demand for competent foremen, and a young man who at the bench or in any subordinate position among the wage-earners gives evidence of fitness and capacity beyond his fellows can have promotion without asking for it. What he has learned in college, combined with what he has learned in practical work, should make him so much more competent than foremen usually are that one responsibility after another will devolve upon him. From that point his fortune is pretty much what he may choose to make it. Capital is constantly on the lookout for men who are distinguished for capacity and skill, and there never has been, and

probably never will be, a time when there is not room for new undertakings to succeed in competition with old ones. These may seem to be mere commonplaces—bits of good advice of the kind ladled out to long-suffering and much-patronized graduates on Commencement Day, but they are something more. I speak for our manufacturing industries. They need every one of the young men who are graduated from our technical and engineering schools—not as superintendents or consulting engineers, but as material out of which to make the great captains of industry who must organize and lead our manufacturing progress to 15 years hence. Trade offers them no such inducements; the professions hold out no such opportunities. No country of the world has such a promise of extensive industrial development as this. The iron and steel industries offer to any young man of good habits, good courage, fixed purpose and a technical education all the chances of success that the most ambitious could desire. They turn their backs upon these opportunities, less because they are afraid of work than because they are deceived as to the conditions of success in manufacturing, and fail to discover that, notwithstanding the apparent tendency to a monopoly by large capital, there was never a time in the history of the world when equal opportunities were offered for those prepared to lead industrial progress.

**Dangers of Natural Gas.**

It is in accordance with what is termed the "law of compensation" that with every great advantage that comes to a person or a nation there must be some corresponding disadvantage. Pittsburgh seems to be realizing the truth of this in connection with natural gas. Quite a number of very serious explosions have occurred, not so much in connection with its use, but with its transport. Until some matters of detail regarding its ignition were provided for, some slight explosions occurred in mills, under boilers and in other places where it was used, but so far as we are aware, there has been no serious danger recently in its actual use for manufacturing or domestic purposes. The trouble has arisen from leaks in the mains. The gas is remarkably volatile, and almost defies restraint. It is a common remark in Pittsburgh that it goes through cast iron as water goes through sand. At the time much of the pipe for its transport through various parts of Pittsburgh was laid there were some legal questions pending that made it important that the line should be laid as rapidly as possible. The precautions necessary to secure the greatest safety in placing this tubing were not possible, and as a result of this and the volatility of the gas, above referred to, quite a number of leaks have been discovered. The explosions that have followed these leaks seem to have wrought injury impartially upon those who use natural gas and those who do not. The escaping gas will, of course, seek the easiest route to liberty; this is not through the frozen ground above it, but through the earth below the frost line. By this route it has found its way into cellars, where it is mixed with the proper proportion of air, and very soon becomes a reservoir of explosive gas, which finds its way into the building above, and, through a lighted lamp or a burning stove, is ignited, and an explosion follows.

It is interesting to note the efforts that are being made to secure safety not only in the use, but in the transport, of this gas. At first there was danger in its use, growing out of the fact that the supply might be suddenly stopped and turned on again without ignition at the point where it was used. One or two slight explosions resulted from this cause. Now, however, shut-off valves and automatic regulators have been provided, so that, in case of the pressure in the main being shut off for any purpose, the valves would close, thus providing against the escape of gas upon pressure in the main being restored. There was also some danger from the great pressure and the possibility of this pressure accumulating in the pipes, owing to non-use of the gas. Safety-valves, however, at different points in the line are being used to reduce this pressure, and means are used to test by compressed-air pressure the tightness of the pipes after being laid and before turning the gas in. Detector or escape pipes are laid which carry off leakage and disclose the location, and several miles have also been laid. It seems, therefore, notwithstanding the danger to which Pittsburgh is subjected by the use of gas, it does not purpose to abandon it. It is altogether too valuable to admit the thought, and, while there are grave difficulties in the way of its use, no doubt these will be overcome, so that in the end its methods of transport will be as safe as those of ordinary illuminating gas.

Mr. Albert F. D'Oench, a practical architect and civil and mechanical engineer, has been appointed head of the Bureau of Buildings of this city, to succeed Mr. Esterbrook, resigned. Considering the peculiarities of the New York municipal government, it must be a pleasant surprise to the public to learn that Mr. D'Oench has not received this appointment for any political reasons, but simply, we are informed, because of his fitness for the position; in fact, there seems to be considerable dispute as to what Mr. D'Oench's politics are, which in itself is sufficient to prove that he is in no sense a "machine man." Another point in favor of this appointment, which is advanced by those qualified to know, is that Mr. D'Oench is both an architect and engineer, having been educated in this country and abroad. This is particularly important when we consider that the Building Law is so very narrow in New York that an inspector, to be really efficient, should understand his business sufficiently to decide on the fitness of buildings when the novelty of their construction would bring them outside the strict terms of the law.

Careful estimates of the number of unemployed men in Cincinnati give the total of 16,700 in the skilled trades, including one-fourth of the ironworkers.



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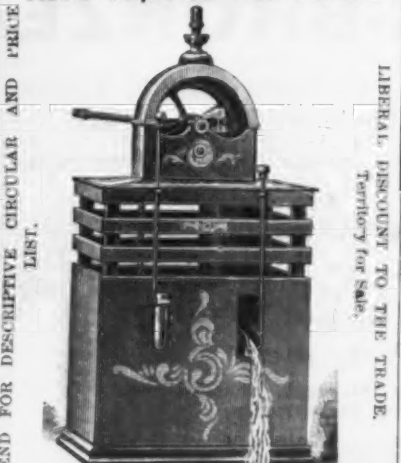


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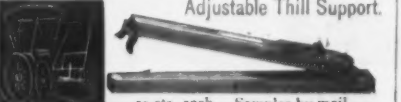
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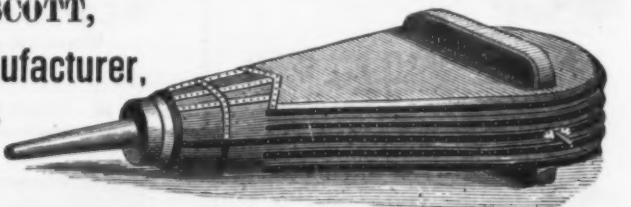
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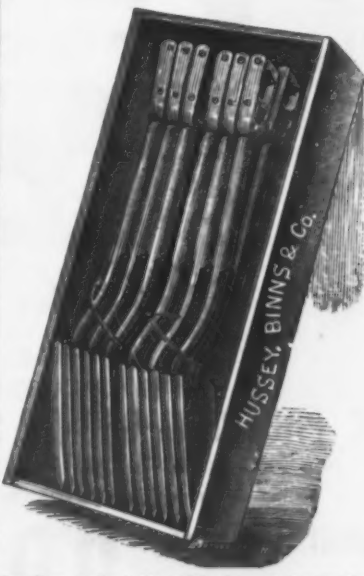
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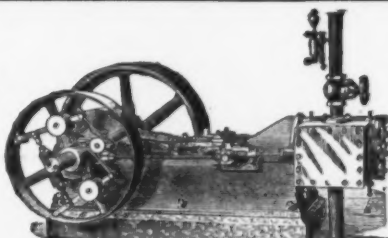
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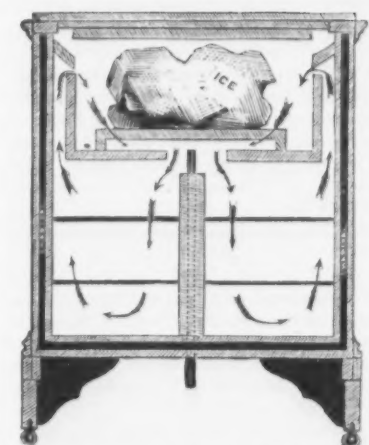
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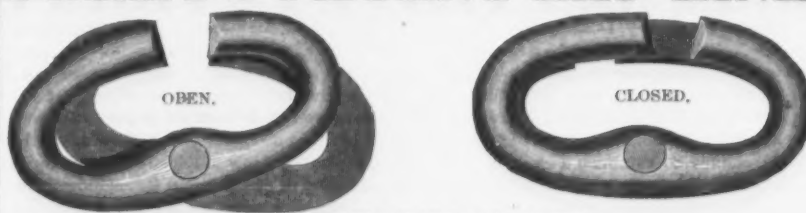
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## METALLURGICAL NOTES.

### The Basic Process in England.

As was to be expected, some English newspapers are up in arms against the reflection implied in a recent statement which has been going the rounds of the press concerning the progress of the basic process. It was hinted that the comparatively slow development in Great Britain might be due to a lack of enterprise on the part of English steel-makers. The London Iron Trade Exchange thus delivers itself on that subject with a good deal of truth: "Our steel manufacturers have no ambition to make silk purses out of sows' ears while they can make them from silk at a smaller cost; they do not desire to lose money by dephosphorizing impure pig iron when they can gain profit by using non-phosphoric iron. The basic process has been a success on the Continent because until its introduction the works there were dependent on importations of Bessemer pig iron from England, or non-phosphoric ore from Spain. Messrs. Thomas & Gilchrist's process enables Continental makers to use their own iron, and, saving the import duties and land carriage on ore or metal suitable for steel-making, amply recoups them for the extra expense of the process and the waste of metal. We repeat what we have asserted on previous occasions—and though our remark may be caviled at, it cannot be disproved—that the basic process has inflicted injury rather than conferred benefit on the iron and steel trades of this country, while it has conferred great benefits on the iron and steel industries of Germany, France, and Belgium. Far be it from us to blame Messrs. Thomas & Gilchrist; on the contrary, we believe that a time will come when their process will be of benefit to our industries, but that time has not come yet. Our steel manufacturers do not grumble at Messrs. Thomas & Gilchrist because of the benefits they have conferred on their rivals abroad; and this is all the more reason why they should not be childishly twitted because they have neglected a process to them at present valueless, and have allowed Continental makers to adopt it on a large scale, under circumstances which render it profitable.

### The Condition of Carbon in Steel.

A final report on experiments bearing upon the question of the condition in which carbon exists in steel was presented at the last annual meeting of the British Institution of Mechanical Engineers by Sir Frederick Abel. The report is a very elaborate and lengthy document from which we take the following as the conclusions: "1. In an annealed steel the carbon exists entirely, or nearly so, in the form of a carbide of iron, of uniform composition (Fe<sub>3</sub>C, or a multiple thereof), uniformly diffused through the mass of metallic iron. 2. The cold-rolled samples of steel examined were closely similar in this respect to the annealed steel, doubtless because of their having been annealed between the rollings. 3. In hardened steel the sudden lowering of the temperature from a high red heat appears to have the effect of preventing or arresting the separation of the carbon as a definite carbide from the mass of the iron in which it exists in combination, its condition in the metal being, at any rate, mainly the same as when the steel is in a fused state. The presence of a small and variable proportion of Fe<sub>3</sub>C in hardened steel is probably due to the unavoidable and variable extent of imperfection, or want of suddenness, of the hardening operation; so that in some slight and variable degree the change due to annealing takes place prior to the fixing of the carbon by the hardening process. 4. In tempered steel the condition of the carbon is intermediate between that of hardened and of annealed steel. The maintenance of hardened steel in a moderately heated state causes a gradual separation (within the mass) of the carbide molecules, the extent of which is regulated by the degree of heating, so that the metal gradually approaches in character to the annealed condition; but, even in the best result obtained with blue-tempered steel, that approach, as indicated by the proportion of separated carbide, is not more than about half-way toward the condition of annealed steel. 5. The carbide separated by chemical treatment from blue and straw tempered steel has the same composition as that obtained from annealed steel.

### Plant and Processes.

D. Lamond, of Allegheny, Pa., has patented a hot blast stove of novel construction. The object of the patented improvement is to insure a more uniform and efficient heating action from the regenerative brickwork. In this class of stoves the trouble is that at the initial end of the heatway the heat is too great, while at the final end it is too small. The inventor seeks to lessen the intensity of the heat at the beginning and to increase it at the end of the heatway. Gas and air is admitted in the usual manner at the foot of the combustion chamber in such proportions as to secure perfect combustion, and in such quantities that the brickwork is not injured. At the same time gas and air is admitted from chambers through ports at the foot of the second uptake of the stove between the combustion chamber and the chimney. In this way the entire brickwork is thoroughly heated, while the heat at the foot of the combustion chamber may be reduced.

A chill for casting car-wheels has been patented by J. H. Whiting, of Detroit, Mich. The chill is designed to prevent the formation of cracks in the wheel by reason of the unequal expansion of the chill and the tread of the wheel, and the consequent breaking of the contact surfaces. The inventor proposes to apply a wrought-iron band to the chill, which is intended to resist the expansion of the same. The band may be either made in two parts which surround the chill and are connected by bolts, or it may be bodily embedded within the chill. It is stated by the inventor that practical experiments have demonstrated that this band preserves the proper contact between the chill and wheel and prevents the formation of chill cracks.

W. McKenna, of Pittsburgh, Pa., has patented a metallurgical furnace for puddling, heating or refining iron and steel. The space beneath the hearth-plate is divided by

a horizontal partition into an upper and lower chamber, which communicate with each other at the front of the furnace. The lower chamber has an air opening at the rear end, and the air, after passing through it and taking up the waste heat, returns through the upper chamber to become still more highly heated. Finally the air reaches the mixing chamber, into which a gas burner is introduced. The heat derived from this construction is said to be very intense, and may be used for oxidizing, reducing or for simply heating. This furnace does away with the hanging arch ordinarily formed in front of the bridge wall.

A water-jacketed converter has been patented by J. Reese, of Pittsburgh, Pa. The converter consists of a lower stationary section and of an upper dome hinged thereto. The lower section is of tubular form, and has a non-metallic bottom and a fixed metal chamber surrounded by a water-jacketed iron lining. The dome has a non-metallic lining and a water-jacketed air tuiere which is inserted into or withdrawn from the metal in the lower section by closing or opening the dome. The trunnions of the dome are made hollow, and serve as conduits. A constant stream of water is kept running through the tuiere and the water-jacketed converter. Should the metal work cold the water may be allowed to rise near the boiling point, but when the metal works too hot a greater stream of water is used. The converter is more particularly intended for smaller works which require from 50 to 100 tons per day and where a plant of small cost is desired.

A cupola furnace of the kind in which the blast is injected beneath the surface of molten metal has been patented by F. W. Gordon, of Pittsburgh, Pa. The tuyere openings are cut through the wall in a slanting direction from outside in—that is to say, the lower or inside end of each opening is below the level of the metal, while the upper or outside end is above such level. The tuyeres may be elevated out of the molten metal and withdrawn entirely from the walls of the vessel, thus permitting the metal to enter the tuyere apertures without danger of flowing from them. All of the tuyeres may, if desired, be geared to operate simultaneously, and when withdrawn the vessel may be transported and the metal drawn off through the tapping hole. By the use of the peculiar tuyere openings the necessity of using tuyere stoppers or tipping furnaces is avoided.

G. Hatton, of Hagley, England, has patented a converter for the manufacture of iron and steel. In this converter the blast boxes and valves are so placed that they cannot be injured by any leakage of the metal through the lining. The converter is made in two halves, of which the upper is stationary and supported by suitable up-rights, while the lower half is removable and attached to the upper half by means of bolts. The air chambers or boxes are located at the sides of the upper part of the converter, and therefore remain fixed. From these boxes extend downwardly and inwardly curved pipes which terminate in line with the tuyeres which pass through the lower section of the converter. Each pipe is made in two lengths, connected by a universal joint. When the lower section of the converter is to be removed the lower end of the pipe is first disconnected, and the pipe is then swung around, so as to be out of the way.

A new refractory lining for Bessemer converters has been patented by H. D. Pochin, of Barnes, England. The inventor objects to the old linings as being subject to rapid wear and being too expensive. He employs chromate of iron and selects such ore as contains the smallest percentage of silica. The chromate of iron is pulverized and mixed with water, tar, melted pitch, crude petroleum or other liquid to such a consistency that the mixture will run freely and fill up the interstices. A cast-iron mold or core is placed inside the converter, and then the lining material is run into the space between the mold and the interior surface of the converter. The lining is to be used in converter employed for the basic and also for those employed for the acid process.

An apparatus for casting and cooling ingots of copper or other metal has been patented by W. F. Durfee, of Bridgeport, Conn., and T. Egleston, of New York City. Beneath the crane arm there is suspended a downwardly-curved double endless chain, to which motion may be imparted by a suitable engine. The molds are arranged in groups of three and are attached to carriers, which in turn are pivoted to the endless chain. To the under side of each carrier there is secured a heavy balance weight. After the first group of molds have been filled, motion is imparted to the chain, and, as the latter hangs downward, the molds are lowered until they are carried into a cooling tank. The horizontal position of the carrier is preserved until its under side comes in contact with an inverting device which causes the molds to turn bottom upward. The ingots, having become sufficiently solidified, will now drop out of the molds and be discharged into a receiving-box. This box is placed into the cooling tank below its water line.

The resolution of the late Prime Meridian Conference, establishing a "universal day," to begin for all the world at the moment of mean midnight at Greenwich, went into effect January 1. Hitherto, unlike the civil day, the solar day has begun at noon, or 12 hours after the civil. But henceforth the two will coincide, and will be counted from zero up to 24 hours. This international arrangement was not intended to interfere with the use of local or other standard time where that is desirable, but to unify the astronomical and civil day, and also to gain uniformity in scientific observations and reports of solar and other physical phenomena over the globe. The change is a manifest advantage, both for practical purposes of life and for the scientific collation of physical data. It involves no perplexing calculations to ascertain the actual universal time in any part of America. This will at once be found in every section of this country by simply adding five, six, seven or eight hours respectively to the standard time of the four districts into which the country, for purposes of time reckoning, has been divided.



# The Iron Age

AND  
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## The Clapp-Griffiths Process.

The principal features of professional interest during the meeting of the American Institute of Mining Engineers were the papers by Messrs. J. P. Witherow and R. W. Hunt, on the Clapp-Griffiths process. We may well say that they created a sensation, emanating as they did from such sources, and bringing forth points, strongly fortified by figures, which will not only upset the views long held by metallurgists, but promise to bring about wide-reaching modifications in present methods of iron manufacture. There has been a tendency among ironmasters to regard highly the claims brought forward in behalf of the stationary converter as modified by Messrs. Clapp and Griffiths, chiefly because the plant at the works of Messrs. Oliver Brothers & Phillips did not run continuously. The causes of the delays are fully explained by Mr. Witherow. Summarizing the two papers, which we print elsewhere, and which we will follow with an illustrated description of the plant in an early issue, we may divide the subject into its technical and its commercial aspect.

It has not been as thoroughly understood as it should have been that the form of the Clapp-Griffiths vessel is not simply a matter of mechanical detail, but that it has a deeper significance. A misunderstanding of this kind underlies the criticism of Professor Peter von Tunner, whose opinions we recently presented. Mr. Hunt, in his paper, dwells on this point, clearly bringing out the fact that the blowing of the metal through tuyeres placed above the bottom of the vessel causes the reactions to differ from those in the ordinary Bessemer process. So far as known, it leads to an almost complete elimination of the silicon, which has a remarkable effect upon the relation between the chemical composition and the physical properties of the steel produced. The Clapp-Griffiths process does not eliminate the phosphorus; in fact, the percentage of

that element in the steel is higher than that in the pig nearly in proportion to the concentration due to waste in blowing. The cinder contains only traces of phosphoric acid. But the elimination of the silicon is well-nigh complete, and this has upon the mechanical qualities of the steel the effect of permitting a very heavy increase in the quantity of phosphorus without entailing those drawbacks which have always caused that element to be regarded as the bane of the steel-maker. The important fact is thus brought out, anticipated years ago by Dr. Dudley through a brilliant deduction from insufficient data, that low silicon permits of high phosphorus. The quality of these low-carbon, low-silicon and high-phosphorus steels was shown, by many samples exhibited, to be exceptional, and the records of the mechanical tests made fully corroborated them.

The mechanical arrangements of the first plant built, following strictly the English designs, were defective in many details. A new plant has been erected. It is now nearing completion, and will probably be in operation within a few days. The principal change made is the providing of a movable bottom to facilitate repairs, and better arrangements for handling product. The chemical questions have been solved, except that the maximum limit of phosphorus allowable has not been determined. The quality of the product is excellent beyond a doubt, and its uniformity seems assured. It remains only to ascertain by steady, continuous work to what capacity it is possible to carry a plant designed to conform with American ideas in Bessemer practice. This will be settled in a short time. Meanwhile, we have the statement of so high an authority as Mr. Hunt that it has done 80 tons and can probably do 100 tons per day.

Turning to the commercial features of the process, we have Captain Hunt's estimate of cost, from which it will be observed that, taking cupola and converter waste at 15 per cent., the cost of ingot was the cost of pig, for conversion ranges from \$6 to \$6.50 per ton, according to grade of pig iron used. This is for mill works starting with cold pig. For those cases where the iron is run directly into the converter from the blast furnace the cost is reduced by \$1.50. It is estimated, further, that the cost of rolling into nail plate, for which the high-phosphorus metal is particularly suitable, would be about \$2. Coupled with the fact that the quality of the steel produced is very suitable for a wide range of articles, these figures alone are eloquent in behalf of the new process. It possesses other features, however, which we believe should be distinctly pointed out. Comparatively speaking, the plant is small and cheap. It may, therefore, without too great an outlay, be adapted to the production of specialties in comparatively small quantity. A mill costing about \$60,000 and producing from 80 to 100 gross tons of steel ingots could, with adequate rolling plant, produce a very high quality of metal at figures which could not be approached by iron works puddling pig and making muck bar. It could at very much lower cost make steel equal in quality to the product of the comparatively slow and costly open-hearth furnace. Besides possessing the advantage of being able to use cheap pig for the manufacture of a metal of very high quality, it requires of its working none of the skilled labor which makes the product of both the iron rolling mill and the open-hearth plant costly. This will be fully understood when we say that at the Clapp-Griffiths works at Pittsburgh there was only one man paid as much as \$2.50 per day. The new process has therefore in its favor cheap raw material, low cost of fuel, moderate repairs and cheap labor on the one hand, and high quality of product on the other.

The possibilities of the new process are indeed magnificent, and with some of the best of our engineers actively interested in it, they will not be allowed to slip away from any want of knowledge or enterprise. It has been suggested that, since the Clapp-Griffiths process has shown its capacity to turn out with special success mild steels, and since it proves that the elimination of phosphorus is not necessary provided the silicon is removed, therefore it covers the ground occupied by the basic process. It is argued that, since we know that phosphorus need not trouble us, the process with which the late Mr. S. G. Thomas was identified has lost much of its interest. We are not able to share these opinions. We believe rather that the new process fills to some extent the gap between the acid and the basic Bessemer process. The latter, it is now known, cannot generally handle with profit metal running lower in phosphorus than 1 per cent. The Clapp-Griffiths, so far as the tests have gone until now, may be said to have advanced the Bessemer limit of phosphorus to about .5 per cent. How much higher the contents of that element in the pig may go is not yet ascertained. It will be noted, therefore, that, instead of competing with other methods of Bessemer steel manufacture, it does in reality step into their line, covering to some extent ground which has remained practically unoccupied until now.

Some further information has come to us as to the nature of the relief fund at the Liévin collieries, in France. The miners contribute to this fund 3 per cent of their earnings, to which the owners add 1 per cent. Each widow receives 32 francs a month. The pension ceases, however, if she remarries, but a lump sum equal to two

years' pension is granted as a dowry. Allowances, in addition to this, are made for children, at the rate of 8 francs a month for boys and 6 francs for girls until the age of 12, when they are received into the service of the company.

## The Iron and Steel Association's Prophecy of Revival.

The address to the iron and steel trades, published last week by authority of the Executive Committee of the American Iron and Steel Association, has been received with somewhat severe and ungenerous criticism. It is pronounced an unwise and ill-considered document, an effort to "boom" the iron market, and an evidence of a lively imagination on the part of the secretary. Without any conference with members of the Executive Committee or officers of the association, we feel quite prepared to say that we regard the publication in question with approval and are glad it has been published.

The gentlemen present at the meeting of the Executive Committee at which the address was considered and approved were Messrs. B. F. Jones, Samuel M. Felton, E. Y. Townsend, J. B. Moorhead, Joseph Wharton, Percival Roberts, David Reeves, Andrew Wheeler, Wm. E. C. Cox, James M. Swank and Geo. W. Cope. Its adoption shows that at least a majority of these gentlemen approved the publication, and, if any of them had reasons for opposing it, such reasons must have received all the consideration to which they were entitled. If one should seek advice as to the probable future of the iron and steel trades, he could not select an equal number of gentlemen whose judgment would carry more weight or inspire greater confidence. It is inconceivable that the document was given to the public without exhaustive consideration or without a full knowledge of its effect upon the public mind. The gentlemen composing the Executive Committee of the American Iron and Steel Association do not perform thoughtlessly the duties pertaining to their office.

We do not believe that it was in any sense an effort to "boom" the iron market. The influence of the American Iron and Steel Association has never been used to promote speculation or stimulate excitement. On the contrary, it has been a conservative force of which the speculative element in the trade has often been impatient. The great interests represented in its councils are not helped by "booms," and if one was imminent the membership would gladly avert it at a cost of a million of dollars, every dollar of which could be raised within 48 hours. "Booms" do not begin in the Iron and Steel Association, but they are more likely to be foreseen there than in any place we know of.

It is possible that the document gives evidence of a "lively imagination" on the part of the secretary, but a lively imagination is a good thing under such circumstances. We remember very well that, under conditions very like those which exist at the moment, Mr. James M. Swank announced the end of the depression lasting from the panic of 1873 to the end of 1878, and predicted immediate revival. We remember that the wisecracks of the trade shook their heads, and declared that they could see no grounds for hope that such rosy prophecies would be fulfilled. But they were fulfilled, as a tornado would fulfill the prediction of a breeze. We hope that in this instance the accuracy of the prophecy will receive much less emphatic vindication.

In reading the address carefully through, we find that the reasons given in support of the belief expressed are consistent with the facts and conclusive. Unless we are wholly mistaken, the conditions are all favorable to revival. If the feeling of hopefulness and confidence expressed in the address can become general we shall see a constant acceleration of the wheels of industry and a rapid reabsorption of the now idle labor of the country. What is said in the address about meeting the incoming Administration in a spirit of confidence, and giving it hearty support until it shall develop a policy hostile to American industry, is eminently wise and sensible. It is impossible, of course, to allay the fears of those who see inevitable ruin in the defeat of the party they have for years supported, but it is possible and desirable that the incoming Administration should be given a fair chance to establish a claim to public confidence. Altogether, we like the document under consideration, and congratulate the American Iron and Steel Association upon its publication. In times like these nothing is more desirable than the courage of convictions, especially when these point in the direction of revival and rest upon a safe and reasonable statistical basis.

A large mass meeting attended by citizens and workmen was held in Brooklyn last week, ostensibly for the purpose of devising measures for the practical relief of the thousands of unemployed workmen in the city. As is too often the case in such meetings, it was controlled by a particular faction, in this instance the Socialistic Labor Party, who, instead of proposing any means for the relief of their destitute brethren, occupied the entire time and exhausted the patience of their audience in making speeches which might be epitomized in the statement that capital is the enemy of labor. Among the radical reforms suggested was the ancient

proposition to abolish machinery and return to unassisted manual labor, by which all present evils would disappear and a new era of happiness to the workmen would be ushered in. Among the many resurrected remedies of the past there is perhaps not one that has less of novelty about it, or is in every way more fallacious, than that which would destroy machinery as the first step toward bettering the condition of the masses. The arguments in its defense have been so many times refuted that it would be useless to notice it were it not that the assertion is always presented by the demagogue, while the reply is too often only to be found in works on political economy which the laboring classes rarely read. If the workman, instead of being carried away by the appeals of the radical so-called reformer, would only devote a little thought and calm reasoning to the subject, and try to inform himself in reference to facts, he would soon see that his condition is far better than that of his ancestors, and that where one dollar was earned half a century ago nearly double the amount is earned now with less labor, while the cost of living has very materially decreased, and he would further see that these advantages are the direct and necessary result of the introduction of and improvements in labor-saving machinery.

## Annual Production of Pig Iron in Three Countries.

It is quite remarkable that we should thus early in the year be in possession of the statistics of the production of pig iron in 1884 in the three leading iron countries of the world. This fact shows what attention is now being given to statistical matters in business circles. For, given a man of unlimited enterprise and indomitable perseverance, he would not be able to secure information of a strictly private character from which to form his statistical tables unless the people to whom he applies were willing to impart it, and they would hardly be willing if they did not think that some benefit would result from it. It is very certain that the business men of to-day know very much more about the progress which different countries are making in all lines than was the case even 10 years ago. But the promptness with which statistics of iron and steel production are now obtained is a very considerable element in their value. This year the statistical bureaus of the different countries are surpassing themselves in this respect.

We have before us the figures of the pig-iron production in 1884 in Great Britain, the United States and Germany, in order of their prominence. In each of the two first countries the production of 1884 fell 11 per cent. below that of 1883, but in Germany, according to the official statement of the Verein Deutscher Eisen- und Stahlindustrieller, there was an increase of 6 per cent. in 1884 over 1883. The aggregates of each country for these two years are as follows, in gross tons:

	1883.	1884.
Great Britain.....	8,430,000	7,528,000
United States.....	4,335,510	4,097,228
Germany.....	3,380,786	3,573,155
Total.....	16,146,296	15,198,283

The falling off in Great Britain in these two years was 962,000 tons, and in the United States it was 497,642 tons. The gain in Germany was 191,367 tons. The proportionate falling off in the production of Great Britain and the United States will not escape notice. We produced a little over 54 per cent. as much pig iron as Great Britain in both years, and in each country the falling off in 1884 as compared with 1883 was 11 per cent. The depression in the iron trade of the two Anglo-Saxon nations, therefore, seems to have been equally severe during 1884, according to this standard of measurement. Mr. Jeans, the secretary of the British Iron Trade Association, says that the decline in the production of pig iron in 1884 is the largest "that has ever occurred in any one year in the history of the iron trade" of Great Britain. The figures for the year are below those of 1880, when 7,749,233 tons were produced by the mother country.

The increased production of pig iron in Germany is a verification of the statement which has often been made during the past year, but has generally been received with little realization of its significance, that the German iron trade was not in such bad condition as that of either Great Britain or the United States. How much effect the changed fiscal policy of the German Government has had in this direction we do not know, but the inference seems to be that it has been of benefit to iron and steel manufacturers. At the same time German exports of iron and steel have been very large, thus showing that the increase in the manufacture of iron and steel has not been entirely due to internal causes, as also that the higher German tariff is not preventing exportation. The increase in the production of pig iron in Germany has been very decided, every year since 1876 having shown an advance, as indicated by the following table:

Years.	Tons.	Years.	Tons.
1876.....	1,846,345	1881.....	2,914,000
1877.....	1,934,235	1882.....	3,187,851
1878.....	2,147,641	1883.....	3,380,786
1879.....	2,286,587	1884.....	3,573,155
1880.....	2,729,067		

It will be seen from these figures that the growth of the German pig-iron industry has been wonderfully steady. There has been no "boom," no sudden jump of 1,000,000 tons a year, as was the case in this country in 1880, but every year for nine years has

shown continuous growth. The production of pig iron in the United States last year was but 500,000 tons more than that of Germany, while in 1883 this country was almost 1,250,000 tons in advance of its Teutonic rival. If our production this year falls below that of 1884, of which there seems to be a reasonable prospect now, we may find, when next January rolls round, that the United States is third in the list of pig-iron producers and Germany second.

We have no data as to the stocks of unsold pig iron held in Germany at the close of 1884, but Great Britain held 140,000 tons more than at the close of 1883, and the United States held about 53,000 tons more than at the close of the preceding twelve-month. This increase in stocks was quite insignificant in the case of either country when compared with the output of the year.

These three countries together produce about four-fifths of all the pig iron made in the world. No other country makes within 1,000,000 tons as much as Germany. The production of France comes nearest, with an annual output of about 2,000,000 tons. No other country makes 1,000,000 tons, much as we hear of Belgian activity in the iron trade, of Swedish metallurgical achievements, of Austrian iron manufacturing, and of Russian iron and steel works.

## Imported Foreign Labor.

The Knights of Labor, who originated what is known in Congress as the Foreign Contract Labor bill, have gained a signal victory. They have won to their side the Senate of the United States in their advocacy of a measure as audacious as it is cunningly contrived. The object of the bill aforesaid is to prohibit the bringing of foreign workmen to this country under labor contracts. Here is an appeal to the demagogism always found in elective bodies, and in the instance noticed it was too plausible and too powerful to be resisted. The bill from the House, which, as amended, passed the Senate on the 18th inst., says:

It shall be unlawful for any person, partnership or corporation in any manner whatsoever to prepay the transportation or in any way assist or encourage the importation or migration of any alien or aliens, any foreigner or foreigners, into the United States, its Territories or the District of Columbia, under contract or agreement, private or special, express or implied, made previous to the importation or migration of such alien or aliens, foreigner or foreigners, to perform labor or service of any kind in the United States, its Territories or the District of Columbia.

Another section declares null and void any contracts made with foreigners with the objects specified. For every infringement of this act there shall be recovered in the courts of the United States a fine of \$1000, and any shipmaster knowingly bringing into the United States such laborer, mechanic or artisan under previous contract or agreement, shall be fined \$500 for each person so brought. This is revolutionary legislation. It seeks to check the influx of that class of producers which in times past was popularly computed to be worth \$1000 per head, all included. The drift and worthless material which largely constitutes foreign immigration may come to these shores without hindrance, but the skillful and industrious, those whose presence is specially sought for and desired, are to be excluded. The proposed statute is no less applicable to the seamen of the lakes or the agriculturists and lumbermen of the Dominion, who periodically cross our northern boundary to assist in navigation or the harvests, as opportunities arise. So, too, of the scores of mills scattered all through the New England States, dependent on help in large measure derived from the Canadas—how will they be affected?

The Contract Labor Bill is a fitting sequel to the Chinese exclusion bill, both alike being repugnant to the foundation principles of the Republic, contrary to all precedent in our national history, hostile to the spirit of our institutions, and an encroachment on individual liberty.

## Bessemer Steel Production.

Almost simultaneously we have reports of the production of Bessemer steel in 1884 in the United States and Great Britain. The American Iron and Steel Association and the British Iron Trade Association are evidently doing their best to secure their usual statistics as early this year as possible. From the reports which these associations have sent out we learn that in 1884 the United States made 1,373,531 gross tons of Bessemer steel ingots, while Great Britain made 1,299,000 tons. The American output was, therefore, 74,531 tons more than the British. This is the first time since 1880 that this country has been ahead of Great Britain. In that year, according to Mr. Swank's report, we were 29,880 tons in advance of our great rival, but the next year we were beaten, and the gap was widened in 1882 to 158,962 tons. Now we are again in advance. This shows that British steel works are feeling the depression in trade more than ours. The production of Bessemer steel ingots in the two countries has been as follows in the past two years, in gross tons:

	1883.	1884.
Great Britain.....	1,553,390	1,299,000
United States.....	1,477,343	1,373,531
Excess Great Britain.....	76,045	
Excess United States.....		74,531

The percentage of decrease in Great Britain in 1884, as compared with 1883, was 24 per cent., while in the United States there was a falling off of only 7 per cent. In the case of Bessemer steel rails the difference in the



trade of the two countries is still more striking, as is shown in the following table of production, gross tons being used:

	1883.	1884.
United States.....	1,148,709	926,465
Great Britain.....	1,097,174	647,174
Excess United States.....	51,535	310,291

The decrease in the production of steel rails in the United States in 1884, as compared with 1883, was only 13 per cent., but the production of Great Britain fell off 40 per cent. Our rail trade we know was seriously depressed, but the degree of its depression bears but slight comparison with that of Great Britain. It should be borne in mind that the figures which are here given for British production cover the whole British rail trade, whether for home consumption or export. Although we exported very few rails in 1884, and Great Britain, as usual, exported the greater part of its production, we turned out of our works almost 350,000 tons more than British rail-makers did; and the British manufacturers had the trade of the world to depend upon, while we practically had only our own market.

#### Our Imports of Iron Ore.

The Bureau of Statistics, in a recent report, furnishes an elaborate table showing the quantities and the values of iron ore imported into this country during the fiscal years 1879, 1880, 1881, 1882, 1883 and 1884, giving at the same time in detail the sources from which these supplies were drawn. Thirty different countries are enumerated, of which the greater number sent only trifling quantities. Deducting the amounts specified as chrome iron ore, which do not in reality belong to the table, since they are the raw material for quite a different industry, we have the following figures as the imports and their values in the years mentioned:

Fiscal year.	Quantity, Gross tons.	Value.
1879.....	150,821	\$348,084
1880.....	425,012	1,192,961
1881.....	620,008	1,697,124
1882.....	575,618	1,576,835
1883.....	605,516	1,549,764
1884.....	558,896	1,817,546

It will be noted that in the aggregate these ore imports continue to be important in spite of the depression here, a fact due largely to the steady decline of values of ore in Spain and other producing countries, and to an unprecedented fall in freights. Both these factors combined have nearly compensated for the lower selling price here, and have kept the imports at very near the high-water mark of 1881.

An analysis of the details given in regard to the sources from which these ores came indicates some important facts. Turning first to Spain we have the following series of figures:

Fiscal year.	Quantity, Gross tons.	Value.
1879.....	80,044	\$154,211
1880.....	134,807	314,074
1881.....	268,575	694,730
1882.....	246,085	608,277
1883.....	343,376	770,968
1884.....	374,943	829,426

These figures show an almost uniform growth, and prove that Spain is gaining ground over other competitors, its percentage of the total imports being in 1884 67.7 per cent. as compared with 42.5 per cent. in 1881.

Next in importance are the French possessions in Africa, which sent the following quantities:

Fiscal year.	Quantity, Gross tons.	Value.
1879.....	31,727	\$82,199
1880.....	113,222	296,758
1881.....	111,345	284,280
1882.....	111,580	312,672
1883.....	108,100	266,786
1884.....	56,448	109,930

The Bona and other Algerian mines are evidently dropping out of the race, and in 1884 sent slightly less ore than those of Sardinia, for which the following figures are submitted:

Fiscal year.	Quantity, Gross tons.	Value.
1879.....	9,008	\$20,786
1880.....	53,755	138,028
1881.....	65,229	173,438
1882.....	54,349	164,598
1883.....	47,147	141,336
1884.....	37,664	104,857

Another quarter from which we get considerable ore, and which it is frequently predicted will become the most dangerous rival of our own mines, is Canada. American capitalists have within the past few years spent very heavy sums of money, but, at least in one conspicuous instance, the funds needed are far in excess of original estimates, and the enterprise is now languishing.

Fiscal year.	Quantity, Gross tons.	Value.
1879.....	3,904	\$8,943
1880.....	39,297	79,386
1881.....	44,177	132,216
1882.....	46,453	120,511
1883.....	46,137	140,827
1884.....	29,125	71,900

Cuba does not yet appear in the list, the shipments not having been made until the beginning of the fiscal year 1885. It may be noted, however, that Greece occupies, for the first time, a comparatively high rank in 1884, with 12,530 tons of iron ore.

The entire imports are, of course, insignificant as compared with the large quantity of ore consumed by our furnaces. They are very heavy, however, when they are contrasted with the output of the mines of New Jersey and New York.

#### The Sirius and Great Western.

New York, February 19, 1885.

To the Editor of The Iron Age.—DEAR SIR: In your issue of February 19, page 7, you say the Great Western and Sirius both made the voyage to New York in 18 days. Please allow me to change this. The Sirius,

from Cork to New York, 700 tons, 18 days, and the Great Western, Bristol to New York, 1340 tons, 15 days, both arrived in New York April 23, instead of June 17, 1838. The *Marine Journal* is in error, I think. Respectfully, A. WARD.

#### Sidney Gilchrist Thomas.

The announcement of the death of Sidney Gilchrist Thomas, in Paris, on February 1, tardily received by mail, will cause much sorrow to his many friends in this country. His worth is so well known and his triumphs so recent that we need refer to them but briefly.

Sidney Thomas was born in April, 1850, and was educated chiefly at Dulwich College, with a view of entering the medical profession, in which his brother, Dr. Llewellyn Thomas, was a well-known specialist, though his own inclinations were toward engineering. His father's death, however, rendered this impossible, and at the age of 17 he entered the British civil service. In 1870, while attending a course of lectures on metallurgy at the Birkbeck Institution, the idea of dephosphorization first took strong hold upon his mind. To use an expression which at that time he was fond of quoting, "the man who eliminates phosphorus by means of the Bessemer converter will make his fortune;" and the commercial idea here expressed was quite as much in his thoughts as the scientific nature of the problem. He proceeded in a strictly logical manner in the study of his chosen subject. Collecting all the data, both chemical and practical, he came to the conclusion, as Gruner had done,

small quantity of 6 pounds up to 10 cwt., and the results all carry out the theory with which I originally started, and show that in our worst cases 20 per cent. of phosphorus was removed, and in our best I must say that 99.9 was removed, and we hope we have overcome the practical difficulties that have hitherto stood in the way." The announcement was received in silence and the subject was dropped. Mr. Thomas's paper describing details of the process was down for reading at the Paris meeting of the Institute in September, 1878, but was last on the list, and was needlessly postponed till the following May, when it was discussed with the greatest interest by a crowded meeting. Copies of the paper had been liberally distributed in Paris, and had been carried thence all over Europe and America, so that every one interested had had six months to study and criticize it.

Meanwhile, Mr. Windsor Richards, of Bolckow, Vaughan & Co., who met Thomas in Paris at the meeting just referred to, was prevailed upon to try the process. This he did with the greatest thoroughness and fairness, at an immense expenditure of time, money and thought, and ultimately the first man who made the process a true commercial success in England adopted it in the works under his management. From this also much of the foreign appreciation of the process is certainly due, owing to the facilities given by Mr. Richards for study by visitors. A claim to priority had been advanced by Mr. Snellus, and a contribution toward basic brick-making had been made by Mr. E. Riley, both of which were met with characteristic fairness by Thomas, and, instead of going to law between themselves, the parties



SIDNEY GILCHRIST THOMAS.—DIED AT PARIS, FEBRUARY, 1, 1885.

that the acid lining of the converter was the great enemy to dephosphorization, and from this to the idea of a basic lining was a natural step. Mr. Snellus had in 1872 patented lime as a lining, and, as Mr. Isaac Lowthian Bell said at the same meeting, lime linings had been used in puddling furnaces before 1850. But the difficulty always had been to make it stand. Numerous experiments appeared to show that a small admixture of silicate of soda with lime, or magnesian lime, or Portland or Roman cement, would give good results, and about 1876 Thomas obtained the able assistance of his cousin, Percy C. Gilchrist, who was then chemist at the Cwm-Avon Works, but soon after went to Blaenavon, where an immense number of experiments were tried. Thomas systematically theorized and planned experiments, keeping up a continual correspondence with his cousin, who carried them out, besides working independently and conferring with him. His brief occasional holidays were spent in running down to South Wales and supervising the more important ones, and it was on one of these scientific journeys that the seeds were sown of the lung weakness which enfeebled his later years. In November, 1877, Thomas took out his first patent, the complete specification being filed on May 21 subsequently. Events, however, moved with him so quickly that, in a letter dated July 2, 1878, he says, "I regard it as somewhat out of date," and, as a matter of fact, patent succeeded patent up to the present year.

Matters up to this time had, of course, been kept very secret. He had but two or three confidants, but the need for experiments on a larger scale led him to seek the aid of Mr. Martin, the manager of Blaenavon, who enabled the experimenters to work with converters holding as much as half a ton, while at Dolwais, through the courtesy of Mr. Menelaus, a few blows were made with a 5-ton converter. On March 28, 1878, the first public announcement was made to the Iron and Steel Institute. Mr. I. Lowthian Bell had read a paper on the separation of phosphorus from pig iron in a furnace lined with oxide of iron. Sidney Thomas was present as a visitor, and during the discussion made the following memorable remarks: "It may be of interest to members to know that I have been enabled, by the assistance of Mr. Martin, at Blaenavon, to remove phosphorus entirely by the Bessemer converter. Of course this statement will be met with a smile of incredulity, and gentle men will scarcely believe it, but I have the results in my pocket of some hundred and odd analyses by Mr. Gilchrist, who has had almost the entire conduct of the experiments, varying from the very

accepted the arbitration of Sir William Thomson as to their respective shares in the ownership of the amalgamated patents, which are now held by a small limited company. It should be mentioned in this place that, although several persons worked at basic processes before Thomas, not a ton of metal was made by such processes before 1878. Then Thomas devoted his life to it, and 864,000 tons were made in 1884. Thomas's foreign patents proved a source of great profit, while in England but a small return has been made. The United Kingdom as a whole has contributed a mere trifle to the money rewards of the inventors of the basic process. The purchase money obtained by Mr. Thomas for the sale of the right to use his process in the United States is all it has yielded anybody in this country.

In 1882 he was ordered to pass the winter in Australia, whither he went via India, and returned through the United States. On this journey, however, he did much work, and came back in the early summer as full of ideas as ever. He only stayed in England a few months, and in September left again for Algeria, tended by an affectionate mother and sister, who had broken up their home to solace his exile. At Bir el Drodj he set up his habitation, including a laboratory, and worked away at the utilization of phosphoric slag and other problems. The patent list early in 1884 shows several applications dated from Algeria, and he wrote thence a multitude of letters to friends and co-workers, showing his activity of mind, directing lines of investigation and experiment, leading, as he hoped, to inventions which would transcend in importance even dephosphorization itself. Last summer he moved north to Paris, where he submitted himself to a method of treatment which promised good results, but the improvement was only apparent, and he died suddenly.

Mr. Thomas will be well remembered in this country. His personal appearance was striking and peculiar. He received honors and rewards modestly, and his boyish face, careless dress and exaggerated forehead suggested struggling genius rather than world-renowned success. He was pleasant and always companionable, bright and entertaining. Those who knew him felt for him a strong attachment, and he will be remembered as one of the most remarkable men this century has produced.

There is reason to believe that the English freight steamers Claudon, Fernwood and Preston, which left this port before the recent gales, foundered at sea with all on board.

#### American Institute of Mining Engineers.

(Second Notice.)

New York seemed bent on showing the visiting members of the Institute the full extent of its resources in the way of weather. Those who arrived on Monday were welcomed with a northeast gale, and crossed the river on the highest tide in the memory of man. Even that truthful relic, "the oldest inhabitant," shook his head and wisely preserved silence about this tide. Monday it snowed and rained and hailed; Tuesday it blew a most biting, chilling wind; Wednesday in the early forenoon it snowed, and the members who tardily wended their way to Hoboken to the Stevens Institute of Technology, where the

#### Wednesday Morning Session

was held, crossed the river through fields of floating ice and the streets of Hoboken through snow drifts. But the warmth of the welcome was commensurate with the severity of the weather. Professor Thurston's lecture-room at the Institute was filled, and before the session was over and the members gratefully accepted the noontide hospitality of Professor Morton the sun was shining again and the snow melting.

The first paper of the session, read by the secretary, was by W. I. Pierce, of New York City, on

#### THE COST OF GOLD MINING AND MILLING IN NOVA SCOTIA.

After giving a *resumé* of the legal conditions of gold mining in Nova Scotia, the paper dealt with the statistics of this industry. Since 1862, when statistics were first kept, 350,000 ounces of gold have been produced from 470,000 tons of rock. The yield has been from 10 dwts. to 1 ounce 2 dwts. a ton, with an average of 14 dwts. The statistics show a steadily decreasing yield of gold per ton. This is due chiefly to the more extensive use of machinery, which has permitted the use of lower-grade ores. The description of the methods used included a statement regarding the ingenious and extensive application of the transmission of power by wire rope.

Mr. P. Barnes, of New York City, followed with an interesting paper on

#### FUEL ECONOMY IN ENGINES AND BOILERS.

The paper set forth the need of the more intelligent and economical preparation and use of steam, pointed out the directions in which this economy was to be sought, and made some suggestions as to remedies and means. A form of stayed box boiler, the details of which were explained, was suggested as safe, economical and practical.

Professor Thurston, in the discussion which followed, briefly, but graphically, sketched the requirements and the limitations of the economical working of the steam engine and boilers and indicated the direction in which improvements were to be sought, and the limitations that would be met with in the search.

Mr. Wm. Kent was inclined to believe that the form of boiler proposed would be a failure, especially when using bad water.

In the absence of Mr. John Fulton, of Johnstown, Pa., Dr. Raymond, the secretary, read his paper on

#### THE SOURCE AND BEHAVIOR OF FIRE GAS IN THE MINES OF THE CAMBRIA IRON COMPANY, JOHNSTOWN, PA.

In the beginning of the paper the history of the Cambria Iron Company, the location and surroundings of Johnstown, situated in a cutting of the lower productive coal measures, 500 feet deep, were sketched; a brief description of the coal beds and ore mines followed, from which it appears that six of the seven coal mines and the iron-ore mines are from 10 to 200 feet above the valley water level, and but one coal mine, now closed, below. The paper also gave detailed statements of the fire gas in each mine and the explosions in connection with it. Three of the coal mines—the Rolling Mill, Coshun and Woodvale—are dry, with considerable coal dust in the main ways. Four—the Blast Furnace, now closed, Lower Gautier, Conemaugh and the iron-ore mine—are all wet. The most destructive explosions so far have occurred in the wet mines.

The coals of the Johnstown sub-basin are exceptionally low in volatile matter. The two principal seams increase in volatile matter both eastward and westward. At Bennington, 28 miles east, the beds contain 26½ per cent. while at Johnstown they have 16½ to 21 per cent. Westward they increase with a regular increasing ratio until the maximum is reached near Pittsburgh.

The source of fire gas, causing flashings and explosions in mines, has not received as careful consideration as its importance would seem to demand. From the fact that it has been found in all the coal beds mined into at Johnstown, it has been inferred that each coal bed, with its rich associated bituminous shales, has produced the gas met with in their respective mine workings.

This inference was doubtless suggested, in part at least, from the condition of the anthracite fields in the northeast section of the State. For it appears evident that the fire gas found in these large coal beds was eliminated by the heat that transformed the normal coal into its present condition of glassy anthracite, each bed of the coal affording more or less fire gas, the bed itself being the chief source. It is quite possible that in the mining operations in the anthracite fields that gas may ascend from the lower to the upper beds of coal if the latter are first mined into. Three objections seem to overwhelm the assumption that the coal beds of the Allegheny are the sources of fire gas:

1. The fact that, where one coal bed has been mined in part or entirely under another, the upper coal-bed workings are entirely free from gas.

2. If the coal beds are the sources of fire gas in this portion of the Allegheny field, then all the mines eastward in the same field should produce fire gas. No gas has yet been found in the large number of mines east of Johnstown. The same absence of gas is noticed in the mines of the Clearfield region. In the Broad Top field fire gas is

unknown in any of its mines. These mines have been extensively worked above and below water level during the past 25 years without the least evidence of the presence of gas. The same absence of gas is observable in the Cumberland (Maryland) coal field. The quality of the coal in the beds in these localities is quite similar to the coal of the Johnstown beds. As a general rule, they hold a little more volatile matter than the coal in the beds of the Johnstown sub-basin.

3. The discoveries of natural gas, the fire gas of the mines, during the past year in such large quantities under the lower coal measures in Western Pennsylvania, beginning at Johnstown and increasing westward to Pittsburgh, afford a definite solution in this portion of the Appalachian field, at least, of the true source of natural gas or mine fire gas.

During the interest in the discovery of natural gas, in the latter part of 1884, the Cambria Iron Company had a test well sunk on their grounds a short distance north of the Pennsylvania Railroad passenger station at Johnstown. The top of this test well is 118½ feet above ocean level, and 12 feet under the Cement coal bed, the third workable coal bed of the lower coal measures. At a well depth of 640 feet, or 540 feet above tide, natural gas was reached, extending down 40 feet, beginning in slate and continuing in sand rock. The gas was ignited at the top of the drill-hole, giving a flame 3 feet high. The supply, however, soon showed signs of weakening. At 800 feet, 38½ feet above tide, a second gas horizon was found less productive than the first. No gas was found below this. Salt water was reached 680 feet below top of well, 500 above tide, and a second large supply 2130 feet below top, 941 below tide level. At 2800 feet drilling was abandoned.

This test-bore hole indicated very clearly the source of the gas met with in the coal and iron-ore mines of the Cambria Iron Company. The gas has evidently ascended through the cracks, cleavage plane openings and fissures of the intervening rocks, reaching the coal and iron-ore beds above. This is corroborated by the fact that all issues of gas yet discovered have been found in the portions of the mines whose strata of underlying rocks have been flexured and broken, affording openings for the upward movement of the gas. The rapid exhaustion of these jets of fire gas in the disturbed places in the floor of mines is in harmony with the rapid exhaustion of the source of it in the test well. As this drill-hole is on the border of the old Blast Furnace mine, it is possible that a portion of the natural gas in this locality may have been dissipated in its workings.

It is difficult to establish the exact place of the gas in the rocks here, whether the horizons in which the gas was found have been its normal home or secondary reservoirs; it seems reasonable to infer that it had its source in the Pocono sandstone (X), the equivalent of the Butler, Clarion and Venango oil sands, and also near the horizon of the carboniferous measures of Eastern Pennsylvania and Virginia.

In the flashes and explosions of fire gas in these mines the gas itself has always been the originating cause. The fine, dry dust has not been observed to contribute materially to the energy of the explosions. If very dry, fine coal dust alone could produce flashes or explosions, then the two or three dry and dusty mines of this company would have been "dark and bloody ground" indeed. It is reasonable to accept the fact that certain qualities of fine, dry coal dust in mines would aggravate the destructiveness of explosions, but the originating cause in all cases of flashes or explosions experienced here has been fire gas.

From the foregoing considerations it appears that these mines of the Cambria Iron Company at Johnstown are situated in the eastern border of the great natural-gas belt which underlies the western section of the State of Pennsylvania. Its western border has not yet been defined. It is quite probable that natural gas may be found underlying portions of the States of Ohio, Indiana and Illinois. From Johnstown the volume of natural gas increases westwardly, having so far developed its largest product at Pittsburgh, Leechburg and Tarentum.

It is not the design of the writer to assume that the source of fire gas, met with in bituminous coal mines, is always found under the coal measures, but from the developments at Johnstown the inference leans in this direction, qualified by exceptional localities. The horizons of the gas wells in Western Pennsylvania are all beneath the coal measures. It will also be evident that in coal-mining operations, where the gas may be met with at uncertain places without warning, and from its imponderable character, not being generally sensible to smell, always invisible and only occasionally heard, great difficulty must continue to exist in defending the mines from explosions. It will be also manifest that in dealing with so subtle an element great caution of statement should be exercised in attributing carelessness of management in cases where the localities of outgushes of fire gas could not be approximately predetermined. The danger from this fire gas increases, as a general rule, westward; the past terrible explosions in the Connellsville region are examples in point. The only present well-assured precautions consist in ample ventilation, using brattice cloth and safety lamps in advanced workings. Even with all these, occasional explosions of this fire gas may be expected.

Dr. T. Sterry Hunt corroborated Mr. Fulton's views as to the low horizon of natural gas, giving the result of his own experience in connection with its occurrence.

The third paper of the session was

#### NOTES ON THE USE OF HIGH EXPLOSIONS IN THE BLAST FURNACE, AND OF A WATER SPRAY FOR COOLING OR BLOWING DOWN.

by W. J. Taylor, Chester, N. J. Mr. Taylor found it necessary to blow down at his furnace to within 3 or 4 feet of the tuyeres. The down-comer was not lined, and it was not practicable to keep the gases cool with limestone. The bell and hopper could be kept cool by filling them with water, but before the stock was blown down 15 or 20 feet the pyrometer in the gas flue on top was up to 1300° and the down-comer red hot. At the suggestion of Mr. Langdon, his assistant, Mr. Taylor concluded to try a water spray to cool the gases by evaporation. The water was introduced into the furnace through the



three 1/2-inch pipes inserted in the plates and hopper to permit of measuring the height of the stock in the furnace. A small stream of water was run into the stock through these pipes, and in a short time the temperature was reduced to 700°. Sufficient water was used to keep the temperature at this point until the stock was down to within 4 or 5 feet of the tuyeres, when a larger quantity was used in order that the furnace might be quite cool when the bell was swung. Too much was used and the furnace was partially chilled. After some clearing of the tuyeres and putting on the blast they brightened some, but the pressure ran up to 14 or 15 pounds, and the engine just turning over. A hole large enough to take in a 3 inch boiler tube was drilled in the cinder notch at such an angle that the tube would strike the bottom of the hearth at the center. A piece of 3 inch boiler tube was plugged at one end with wood loaded with 5 pounds dynamite (No. 2 giant powder), two fuses with two caps attached, lighted and put in the furnace. The explosion did no harm, but broke up the cemented stock. The belly-pipes were replaced and the blast put on, showing a pressure of only 2 pounds. The tuyeres brightened and cleared themselves of cinder, and in 3 hours cinder was tapped at the notch. Every furnaceman who knows the difficulty of bringing out a furnace that is chilled solid in the hearth, not with iron, for this seldom occurs, but with cinder, and who knows that there is no relief until a clearance can be made through or up to the loose stock, will realize the advantages in the use of a few pounds of dynamite. Its explosion breaks up the salamander of cinder and coal in an instant sufficiently to allow the blast to enter and the gas to escape, thus accomplishing in a moment what would otherwise require days.

Another case in which Mr. Taylor found the use of dynamite of great advantage was when the stock "bridged" on the boshes in blowing in. Regarding its use for this purpose he states:

"I have had this occur twice at the Chester Furnace, and on both occasions the relief was complete. The first time it occurred the stock stopped settling entirely in about 6 hours after putting on the blast. The furnace got tighter and tighter till the pressure was about 15 pounds, with the engine just turning over. The tuyeres were all bright and good and dry, but there was no escape for the gas except where it was breaking through the walls about the tuyeres. This was the condition of things after blowing about 12 hours. The stock had not settled any for 6 hours. I was well satisfied by this time that the coal had bridged or arched on the boshes, and as the ore above it was reduced and disintegrated it worked down into the interstices till they were all closed, leaving no vent for the gases; hence the high pressure. Nothing could be done till the arch was broken. We stopped the engine and drilled a hole into the furnace about 13 feet above the tuyeres, where we found, as I expected, a cavity nearly the full diameter of the furnace and about 6 feet from the top of the lower or loose coal to the under side of the circular arch. We charged a 2-inch gas-pipe with about 7 pounds of dynamite, in the same way as before explained, and exploded it as near the center of the cavity as we could, so that the concussion would break the arch. No harm was done except to drive the clay packing out from one of the tuyeres and raise a little dust on top, and the result was a complete success. The arch was broken and the stock settled immediately. We closed up the hole and put on the blast, and the furnace traveled right off as though nothing had happened.

"My second experiment was just the same, only the stock did not settle 6 inches from the time the blast went on till we were struck by the high pressure and break-outs at and above the tuyeres in about 6 hours. On opening the same hole we found the bridging and all conditions practically the same as in the first case, but the explosion did not seem to break the arch as thoroughly, and as near as we could tell only about two-thirds of it came down; consequently, the furnace settled faster on one side than on the other. We drilled in on the high side, about 15 feet above the tuyeres, the next day, and found the stock settled the same on that side as on the other, and the furnace was normal.

"I have also tried the effect of powder on dirty walls or partial scaffolds after the furnace had been in blast for some time, by exploding a moderate quantity of powder—say, one or two cartridges—just inside the walls where the stock was not moving, but never got any permanent benefit from it. It would seem that the stock was too pasty, confining the effect to a very small space, while in the case of the bridging the blast had been on such a short time that the stock at that point was only red-hot; hence it was dry instead of pasty, and in good condition for the action of the powder. In the case of the explosion in the hearth, the cinder was all cold and set, which also made the conditions right for breaking up the whole mass with an explosive. A bad ring scaffold might, I think, be removed if it was pretty well up in the furnace and the furnace was blown down below the bottom of the scaffold and a few capped cartridges dropped in from the top; or a hole could be drilled in from the side, where the thickness of the stock would admit of it, at a point below the scaffold and over the loose stock, and the powder put in with a pipe; or a hole might be drilled from the outside directly into the thickest and strongest part of the scaffold and near the bottom of it. In this way the powder might break the ring, thus bringing down the whole scaffold. If not, one or two more holes might be put into the scaffold where it was not broken. I have had no experience in this, however, as I have had no ring scaffold to contend with since I learned the use of powder; but I think now I could break down ring scaffolds with powder that formerly I would have blown out for.

"Whenever powder is to be exploded where there is sufficient heat to ignite the exploders in a short time, no fuse need be used, but I always put more than one exploder in with the powder—two or three would be better. When the heat is not sufficient I put in two fuses, to make sure of one, and light the fuses first, and then slide the pipe in the hole to the point where the explosion is wanted. In

either case the pipe should be tamped with sand on top of the powder, same as in an ordinary rock blast, but I never did any tamping around the pipe after it was inserted for exploding. A boiler tube with a wooden plug driven in one end is better for loading than gas-pipe, as it is not so thick and strong.

"Returning to the use of the water spray for blowing down, I would say I blew down the straight furnace once after the time previously mentioned, and also blew out both times with it with complete success and without chilling the hearth or getting any water in the belly-pipes, one experience of that kind being quite sufficient. I am satisfied this is the simplest and easiest way of either blowing down or blowing out a furnace, as the evaporation of a small amount of water absorbs a large amount of heat. If there is a hole near the center of the bell large enough to admit, say, a 3/4-inch pipe perforated at or near the end with small holes equal to, say, one-half the area of the pipe and then put on a good pressure of water, commencing soon after blowing down is commenced and before the bell and down-comer get hot, there is no trouble to hold the temperature of the escaping gases to, say, 800° or 900° all the way down, by regulating the quantity of water to suit, particularly if plenty of water is kept in the bell and hopper. Of course the more the water is split up in a spray the better the gases can act on it and vaporize it before it reaches the coal or stock, and the less water is required. Little or no more water should be put in than does vaporize before reaching the stock, but we found no chilling below when we only put in water enough to hold the pyrometer at about 900°, against about 600°, which was the temperature we reduced the gases to just before stopping, the first time we used water and chilled."

The last paper of the session was an illustrated one on "A New Regenerative Hot-Blast Oven," by John C. Long, Mechanicsburg, Pa., which we shall present in full in a future issue.

At the close of the session the members and their ladies were entertained by President and Mrs. Morton at luncheon, at their residence, near the Institute.

The afternoon was devoted by the members to visiting various points of interest to which invitations had been extended. Quite a number accepted the invitation of Lieutenant Derby, the officer in charge of the Government tunneling at Flood Rock, East River, to visit and inspect the condition of the work for removing the last obstacle to Hell Gate navigation.

#### Wednesday Evening's Session

was held in the hall of the New York Academy of Medicine. The large attendance that characterized all the meetings was still kept up. The first paper was by Mr. J. P. Witherow, of Pittsburgh, Pa., on

#### THE CLAPP & GRIFFITHS PROCESS.

Mr. Witherow, after a narrative of the circumstances which led Mr. Henry W. Oliver, Jr., of Messrs. Oliver Brothers & Phillips, Pittsburgh, and himself to become interested in the process during the course of a visit to England describes as follows the results of the work done after it had been decided to put up a converter at the works of Oliver Brothers & Phillips, at Pittsburgh:

The completion of Mr. Oliver's converter was much delayed, owing to our having decided to make it an exact copy of the 3 ton converter we had seen in Wales. We also bought bricks for the lining and for tuyeres and tuyere-blocks in England, and had to await their arrival. From these causes we were not able to commence until the beginning of April. The materials for the converter were brought from abroad simply because we wished to have everything the same as was in use there. When the converter was put in operation everything seemed to go off satisfactorily, and the first blow, although it took much longer (everything being cold), made excellent steel. After starting up the next day and making a few blows, it was found that the tuyeres and tuyere-blocks were burned off, and that the reactions of the converter had torn the lining all to pieces. The conclusion was at once reached that we had made a great mistake in ordering the fire-brick from the Stourbridge Works instead of from the fire-brick factory in Wales, at which the parties there got their tuyeres and tuyere-blocks made. Mr. Oliver, therefore, at once cabled to have new tuyeres and tuyere-blocks sent from Wales, and operations at the converter were suspended until these should arrive. It required six weeks before they were delivered and the converter was ready for blast again.

Although at the second starting up much better work was done than before, still the tuyeres, tuyere-blocks and linings did not resist the reactions much better than the first materials received, and it became evident that something else than brick must be used as lining. We then began to experiment with ganister for lining, and soon succeeded in making it answer for this purpose reasonably well. We were then in a position to do fairly good work. However, when those in charge of the plant began to make three blows per hour and work up to a reasonable output and efficiency they discovered that the steam cranes provided for handling the ingots were inadequate, and that that part of the plant would have to be remodeled. As Mr. Oliver had no blooming mill, it was necessary to cast small ingots, and this resulted in great difficulty in getting the ingots out of the molds and a sufficient number of molds prepared for the succeeding blow. Mr. Oliver therefore decided to replace the steam cranes with hydraulic ones and to erect a steam hammer, so that he would be able to manipulate larger ingots. To do this it was necessary to again suspend operations. It was then midsummer and the converter was not again operated until autumn, it requiring over two months to make the above changes.

When we started up again the plant worked very satisfactorily, everything seeming to come up to reasonable requirements, and, commencing at 8 o'clock in the morning and stopping about half-past 2, we were able to make from 25 to 30 tons of ingots.

After working for several weeks with fair success in this manner it was discovered that still one important change would have to be made before the plant would be fitted

and thoroughly equipped for large work night and day, viz., that it would be desirable to have the converters with movable bottoms, so that, instead of having to stop and cool the converter in order to repair the lining of the bottom, the entire bottom section could be detached, lowered on to a car by means of a hydraulic piston and removed, its place being at once supplied by a new bottom, elevated into place by the same means. Any repairs the lining may require can be done when the bottom is removed. In this way we feel satisfied the converters can be kept steadily at work night and day, and nothing can occur to interrupt the process. This was decided on early in January, and the two old converters were at once dismantled and new ones have been built at my shops. Besides the movable bottoms, changes will be made in many important parts, and we expect to have the new plant in operation between the 23d and 25th prox., when we cordially invite any practical ironmasters or experts from any part of the country to critically inspect and investigate our plant and its operations and results, to decide for themselves whether our statements are well founded.

I am not insensible to the fact that, in view of the interruptions which we encountered from the beginning, in consequence of the reasons I have given, and which caused a suspension of operations at three or four different times during the summer and fall, it was assumed and quite generally recognized and conceded by our Pittsburgh friends, and by some outside of that city, that the process was a failure, that there was something about it which we were concealing, and that, therefore, it might be taken for granted we were greatly disappointed, and that there would be no future for that type of converter or for the process as a whole. I will not assume (even if I were qualified both theoretically and practically to enter the field as an expert on the steel business) to submit to you any of the chemical and physical tests that have been made, as we have desired and requested Captain Hunt to handle this question from an impartial standpoint, and viewed through the spectacles of one of our great Bessemer chieftains, who, I assure you, will not be disposed to give praise to anything that does not deserve it, apart from the Bessemer operations.

I will therefore confine myself to a few remarks on the commercial aspect of the process and the developments that we made amid all our troubles and stoppages. When I first saw the process in use in Wales, I remarked that I saw in this type of converter the greatest boon to ironmasters and the iron interests of the United States that had been introduced into America during the last 25 years. I at once conceived the idea that these converters should be placed adjacent to the casting-houses of blast-furnace plants, when the iron could be taken from the furnace every 4 hours, being run directly into an iron car lined with brick and drawn by a light locomotive, precisely as many of our modern furnaces now dispose of their cinder with our improved cinder cars. The car would pass on an elevated track alongside the converter, the molten iron being poured into an intermediate ladle and weighed, and a proper quantity of it charged into the converter to be blown. This operation would be at once very simple and very efficient, and would enable our furnacemen to sell their product as steel or ingot iron instead of pig metal. The steel or ingot iron would have fully double the value of the pig iron and would not cost its manufacturer more than \$4 more than the pig. The men now employed in the casting house and in piling iron could be transferred to the converter. It requires only about 15 men to manipulate the converter and handle the ingots, and eight or ten of these could be spared from the casting-house. It is probable, therefore, that the whole cost of the process, including labor, refractory materials for the converters, ferromanganese and all other expenses pertaining to maintaining and handling the converter, would not make the cost of the finished ingots exceed that of the pig iron more than from \$3 to \$4 per ton, which would include the 10 or 12 per cent. waste. If, therefore, the owners of blast furnaces by an expenditure of some \$30,000 can convert their product into ingots instead of pig iron at a cost not exceeding from \$3 to \$4, the change nearly doubling its value, it certainly places the blast furnaces in a different position from the one they occupy at present, and I think that no improvement has ever been introduced at a more opportune time or deserved a warmer welcome than such a process applied at this time to blast-furnace practice.

From a commercial point of view we have made at the Oliver plant during the past summer and fall about 2000 tons of steel; and, apart from what he consumed himself, much of this was sold to parties through whom he wished to introduce it to the trade, and all parties who have used it have ordered more. We have carefully kept account of our expenses while making these 2000 tons, and find that, including cost of ferromanganese, coke and keeping up the plant, expenses for steam power, labor and everything connected with the process, it cost did not exceed \$6.50 per ton over the price of the pig iron used. It should be remembered that while making these 2000 tons we experienced all the backsets and interruptions I have referred to, and the plant being the first experimental one, the expense for labor, &c., was much larger than with our present experience it will be hereafter. We feel, therefore, that we are safe in assuming that the process can be conducted in mills at a cost not exceeding \$6 per ton, and at blast furnaces, in the manner I have described, for from \$3 to \$4 per ton, as above stated.

Now, since it requires an expenditure of \$12.50 to convert a ton of pig iron into muck bar (which is the general cost at our Pittsburgh mills), and since by our process a ton of pig iron can be converted into steel blooms at a total cost of about \$6 in mills, and from \$3 to \$4 at blast-furnaces (in the latter case saving also a part of the freight on the pig metal to the mills), you can from these data form some estimate of what the economy to our iron trade will be when this process shall be in general use at our mills and blast-furnaces.

I am not insensible to another important consideration which, I have no doubt, has

presented itself to the minds of many, viz.: Will not the quality of the product be entirely dependent on the quality of pig metal the furnace is producing, and will not the many changes that blast-furnaces undergo both in quality and grade of pig metal materially affect, if not destroy, the application of such converters to blast-furnace practice as I assume?

In the first place I would state that I am satisfied, after you hear Captain Hunt's paper, you will be convinced that our developments have demonstrated that phosphorus is not the devil which it has been heretofore held and maintained as being when existing as one of the unavoidable constituents of iron or steel. When we have convinced you that from pig iron containing from .5 to .6 per cent. phosphorus we have made rods which have withstood a tensile strain of 70,000 pounds per square inch with 25 per cent. elongation and 36 per cent. reduction of area; that said steel was made into plates, and the most superior nails in the country produced therefrom; that we have welded it as shown by the specimens we herewith submit, we think you must then admit that when carbon, silicon and other metalloids are completely expelled from molten iron and steel the presence of phosphorus develops different properties from those which have heretofore been conceded to it. Indeed, such results have been quite a surprise to us, and we have made many experiments in this direction. If, therefore, from pig iron containing from .5 to .6 per cent. of phosphorus this superior steel or ingot iron can be made and adapted to nearly all commercial purposes, this question of phosphorus will henceforth be placed in a different light and assume a different position in our metallurgical views, conceptions and requirements.

If this process supersedes puddling (which assuredly it must do) there will be no mill cinder to be used in blast-furnaces, and, consequently, the amount of phosphorus which is ever being accumulated by the use of mill cinder will be cast aside, and the quantities of phosphorus in two-thirds of the leading brands of our irons will not exceed .5 per cent. Therefore, phosphorus will no longer be the great obstacle in the path of the iron manufacturer it has heretofore been assumed to be, and thus will be opened up a new avenue for the conversion into steel of various brands of iron that have been absolutely forbidden and set aside as unfit for the common Bessemer. Because we have all heretofore bowed to the will of the Bessemer king, his mandates have been imperative, and his assertions had to be taken for granted everywhere as absolute demonstration without questioning the philosophy or reasons therefor. It will, therefore, be gratifying to the blast-furnace interests generally if they are able to take a position on this question and make a steel superior for all commercial purposes to that of the Bessemer. Indeed, as you will soon know from our actual developments and experiments, we find that our steel is of fully as good a quality and more uniform than that of the open-hearth process when made from the same pig metal, and when the costs of making steel by these two methods are contrasted the difference is largely in favor of our system.

One thing I would state, before closing, relative to the application of this type of converter directly to blast-furnaces, and to the question whether we will not experience difficulty in keeping the metal liquid between casts. As you are well aware, at many plants abroad the molten iron is conveyed from 3 to 10 miles from the blast-furnace to the Bessemer converters, and then often it has to wait a considerable time before being poured. And, as you are also aware, at all Bessemer works, such as our great Edgar Thomson plant, where the direct process is used, the molten iron frequently remains in the cars from 3 to 4 hours before being poured into the converter. I have assumed that a blast furnace using this type of converter would cast every 4 hours, and that the whole cast would be run into two or three cars, according to its amount—into two cars if the quantity would be from 15 to 20 tons; that these cars would be heavily lined with fire-brick, which would be washed and dried, so as to prevent, as much as possible, the adhesion of the iron; that a movable lid would be placed thereon, which would also be heavily lined with fire-brick, which cover would be lifted by a crane when the car arrived at the converter. The contents of the first car would then be converted into iron or steel (say it would hold 10 tons) in less than 1 hour. Thus, within 2 hours one converter would make over 12 tons of steel, and, indeed, this one converter would be capable of converting within 3 hours, say, the whole 20 tons. But, as there would be two or more converters, it would be easy to have the contents of all the cars converted into steel or ingot iron within 1 1/2 hours. However, should the iron at any time become a little chilled while standing, though still remaining liquid enough to run into the converter, an arrangement can be made, which I have designed, for blowing the converter for a time with hot or superheated blast. That is to say, a pipe from the hot blast main of the furnace to the cold-blast main of the converter can be established and so governed by valves that hot or superheated blast can be applied in a moment, should it be required. And, as the pressure of the engines can be regulated for that few minutes to the needs of the converter, the process can go on as if the iron was very hot and highly charged with silicon.

Moreover, it is well to introduce this feature of a communication between the hot-blast main and the converters, because a great deal of steel scrap can be put in the converters before pouring the molten iron therein, and to overcome the cooling effects of this scrap, provided the iron is low in silicon, the hot blast can be used for any portion of the time of the blast. Thus, by this means any desired quantity of scrap can be easily mixed with the charge.

As a matter of course, as soon as this process and type of converter is applied to our blast-furnaces we will have the benefit of the experience of all the blast-furnace engineers, with their ever-fertile brains improving and perfecting this system, and, as they are ever exchanging opinions and profiting by experience, it is safe to assume that in a short time the manipulation will be as simple and almost as cheap as running the iron into

the pig-bed, apart from the waste in the converter and the cost of ferromanganese.

Prior to the discussion, Mr. Robt. W. Hunt, of Troy, N. Y., read an additional paper on the same subject.

#### THE CLAPP-GRIFFITHS PROCESS.

Having devoted considerable time to the investigation of the Clapp-Griffiths converter and the metal produced in it, it may perhaps be of interest to the Institute to learn the conclusions which I have formed. Of course, it is well known that the stationary converter of small size is the very oldest type of vessel used in the pneumatic process. Hence it will be only necessary to call your attention to the points which are special features of the Clapp-Griffiths. This converter has a slag tap-hole, situated at such a height in relation to the metal under treatment that, when the cinder is formed and boils up as the blow progresses, it can run off and thus be removed from contact with the iron, and will also be out of the way when the decarbonized metal is tapped into the casting ladle and the manganese alloy added. The manner of shutting off the blast when the process is completed and the metal is being tapped is another distinctive feature. The tuyeres are situated around the sides of the vessel, and enter the interior some little distance above the bottom; they are provided with plugs through the center of which there is a small opening. When the blow is completed these plugs are forced forward into the outer orifices of the tuyeres, thus shutting off the blast, excepting the small quantity entering through the passages named. While this is sufficient to keep the metal from running into the tuyeres, it reduces the action of the blast while the metal is being tapped to the minimum. Of course, this is of great importance, as in an ordinary stationary converter any delay in getting open the tap-hole means overblowing, and even while the first part of the charge is running out the oxidation is in full force. Duplicate or movable bottoms are used, thus more than doubling the possible output of the plant. The pressure of blast is quite light, never exceeding 3 pounds, and usually only 5 pounds is used. To the Bessemer engineer accustomed to large converters and great output a plant of converters having a capacity of some 4000 pounds at each heat seems like a plaything and one with which it would be impossible to compete against the larger plants. Certainly such were my first impressions, but I can assure you the matter will bear investigation. In the first place, a complete plant of two vessels can at the present time be constructed for not over \$55,000, including all buildings, and I am satisfied that 80 gross tons of ingots per 24 hours can be made in it with the greatest ease, and no doubt this output could be brought up to 100 gross tons. The strain upon all the parts of the plant being so light, the item of repairs is very low, and the general operating expenses are small. I therefore believe the Clapp-Griffiths converter will be found desirable for existing works whose products in the past have been exclusively wrought iron. By a comparatively small outlay they can meet the growing demand for steel, and thus give the world its advanced material without rendering idle and useless many thousands of capital. We have so often doomed the puddling furnace, in spite of which it has continued in full life, that I will not again announce its death-knell, but will say that the possibilities of the Clapp-Griffiths do not seem to favor its continued vigor. In estimating the cost of producing soft-steel ingots in a properly-arranged Clapp-Griffiths plant my figures are as follows:

Iron.....	\$17.00
Fifteen per cent. loss.....	2.55
Labor.....	1.50
Coal.....	.30
Ferromanganese.....	.30
Refractories.....	.30
Molds.....	.15
Expense and repairs.....	.50
Total.....	\$25.10

This is for metal made from an ordinary Bessemer iron, but if, as I will show later, that for many purposes a cheaper iron can be used, my figures would be:

Iron.....	\$16.00
Fifteen per cent. loss.....	2.40
Other items.....	3.55
Total.....	\$21.95

Either of these figures are certainly under the cost of muck bar in the most favored localities; but it may be said that we have in the one case ingots which have to be broken down, while in the other bars which may be piled and rolled direct. I think this account will fully balance itself in this way—for all large sizes of iron made from puddled bar you must have a reworked top and bottom, and for very small ones billets, while by using proper sized and shaped ingots, and careful work in the steel pit, they can be rolled direct into many things. It is in this respect that the small plant differs from the large one. With a product of 400 to 500 tons per day, it is impossible to submit to the delay incident to casting small ingots. With the smaller product, but still one which is up to the maximum of economy of the plant, no delay is caused. The next thing to be considered after the cost of making the product in the Clapp-Griffiths converter is the quality of the metal produced. In the Clapp-Griffiths plant of Messrs. Oliver Bros. & Phillips many hundreds of tons of this metal have been made and placed on the market in different forms, such as tacks, rivets, wire rods, telegraph wire, lightning-rods, horse-shoe nails, pipe strips, plates, sheets, bars, angles, shovels, spades and stamping iron, and, so far as I have been able to ascertain, great satisfaction has been obtained in its use for these various purposes. In fact, large quantities have been used in the place of imported Swedish bars with success, and the workmen manipulating it were none the wiser. When first starting the works the best brands of English Bessemer irons were used, and the steel produced was of a most satisfactory quality. But I am assured that this grade of pig was continued for a very short time. Indeed, I am under the impression that altogether less than 100 tons of this iron was ever purchased for the works. The metal produced so far exceeded all requirements that the use of iron of a lower standard was ventured upon, hundreds of

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Wetherill Robt. & Co., Chester, Pa., 47

## Engravers, Wood.

Crosscut & West Engraving Co., Phila-  
delphia, Pa., 41

## Expanding Mandrels.

Cooke &amp; Co., 22 Cortlandt, N. Y., 9

## Facings, Foundry.

Enterprise Mfg. Co., Philadelphia, Pa., 42  
Obermayer S. & Co., Cincinnati, O., 15  
Paxson J. W. & Co., 514 Beach, Phila., 5

## Farm and Garden Tools.

The Pacific Rolling Mill Co., Paterson,  
N. J., 30  
The Williams & Hobbs Mfg. Co., Bridge-  
port, Conn., 30  
Clister Iron Works, Saugerties, Ulster  
Co., N. Y., 4  
Whitney A. R. & Co., 58 Hudson, N. Y., 4  
Wood Alan & Co., Arch, Philadelphia, 5

## Forgings, Iron and Steel.

Hicks & Dickey, Philadelphia, Pa., 32  
Pennsylvania Steel Co., Dauphin Co., Pa., 12

## Foundry Supplies.

Emerick J. A. &amp; Co., Philadelphia, Pa., 3

## Friction Clutches.

Bates H. N., Boston, Mass., 45

## Furnace Hoists.

Stokes &amp; Parrish, Philadelphia, Pa., 46

## Furnace Lamps.

Taylor &amp; Boggia Fdry. Co., Cleveland, O., 37

## Gates, Folding.

Composite Iron Wks. Co., 93 Church, N. Y., 3

## Glass Cutters.

Andrews Thos. J., Philadelphia, Pa., 44

## Gin Ribs, &amp;c.

Chas. F. Lombard, Augusta, Ga., 4

## Grain and Seed Separators.

Newark Machine Co., Columbus, O., 13

## Grinders' and Polishers' Supplies.

Union Stone Co., Boston, Mass., 11

## Grindstones.

Berea & Huron Stone Co., Cleveland, O., 35  
Ohio Grindstone Co., Cleveland, O., 35  
Wood, Walter R., 283 and 285 Front, N. Y., 35

## Gunpowder, Makers of.

Lafin &amp; Rand Powder Co., 29 Murray, N. Y., 8

## Hammers.

Buffalo Hammer Co., Buffalo, N. Y., 40  
Hartford Hammer Co., Hartford, 39

## Hammers, Steam.

Bradley &amp; Co., Syracuse, N. Y., 48

## Hard Force Pumps.

Union Mfg. Co., 90 Chambers, N. Y., 7

## Hardware Comm'n Merchants.

Field Alfred & Co., 93 Chambers, N. Y., 10  
Graham J. H. & Co., 113 Chambers, N. Y., 8  
Haines, Samuel A., 88 Chambers, N. Y., 12

## Hardware Importers.

Field Alfred &amp; Co., 93 Chambers, N. Y., 10

## Hardware Manufacturers.

Enterprise Mfg. Co., Philadelphia, 42  
Haines, Samuel A., 88 Chambers, N. Y., 12  
Union Mfg. Co., 90 Chambers, N. Y., 7

## Hardware Specialties.

Amidon & White, Buffalo, N. Y., 35  
Andrews Thos. J., Philadelphia, Pa., 44  
Globe Mfg. Co., Philadelphia, Pa., 30  
Hobbs & Co., Worcester, Mass., 45  
Moore S. H. & E. Y., Chicago, Ill., 29  
Rex A. C. & Co., Philadelphia, Pa., 26  
Underhill, Clinch & Co., 91 Chambers, N. Y., 10

## Hardware, Theatrical.

Martin Samuel, 127 Eighth av., N. Y., 7

## Harnes Snaps.

Covert Mfg. Co., West Troy, N. Y., 46  
The Menely Hardware Co., West Troy, 10

## Hay Knives.

Hiram Holt &amp; Co., East Wilton, Me., 8

## Hinges.

Stanley Works, New Britain, Conn., 39  
Union Mfg. Co., 90 Chambers, N. Y., 7

## Hoes.

Bruce George W. &amp; Platt, N. Y., 0

## Hog Ringers.

Chalmers, Bering & Quinlan, Decatur, 4  
Slye & Beery, Upper Sandusky, O., 37

## Hoisting Machines.

Box Alfred & Co., 314 Green, Phila., 45  
Moore S. H. & E. Y., Chicago, Ill., 29  
Scranton Mfg. Co., Chicago, Ill., 44  
Stearns E. C. & Co., Syracuse, N. Y., 48  
Victor Mfg. Co., Newburyport, Mass., 38

## Horse Nails, Makers of.

Essex Horse Nail Co., Essex, N. Y., 9  
National Horse Nail Co., Vergennes, Vt., 26  
Northwestern Horse Nail Co., Chicago, 35

## Horse Raps and Files.

Heller &amp; Bro., Newark, N. J., 8

## Horse Shoes, Makers of.

Rhode Island Horse Shoe Co., Providence, 12  
The Burden Iron Co., Troy, N. Y., 4

## Hot-Blast Stoves.

Witherow James P., Pittsburgh, Pa., 4







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D. T. PARKER,

Anniston, Alabama.

## Trade Report.

## British Iron and Metal Markets.

[Special Cable Dispatch to The Iron Age.]

LONDON, WEDNESDAY, February 25, 1885.

**Scotch Pig.**—The market is a little steadier. We quote makers' brands as follows:

Coltness, alongside, Glasgow	55/5
Langloan	54/6
Gartsherrie	52/
Summerlee	51/
Carnbroe	50/
Glenarnock	48/6
Ardrossan	48/6
Eglinton	48/
Dalmellington	46/6
Shotts	46/
at Leith	52/
Lichterage from Ardrossan to Glasgow is 1/8	

**Cleveland Pig.**—The market is irregular. Manufacturers have agreed to continue restricted production 15%, owing to large stocks. We continue quotations, f.o.b. shipping ports:

Middlesboro, No. 1 Foundry	38/
No. 2	36/6
No. 3	34/6
No. 4 Forge	32/

**Bessemer Pig.**—Is unchanged. W. C. Hematites are quoted 44/ @ 44/6 for mixed lots, Nos. 1, 2 and 3, equal portions, f.o.b. shipping ports.

**Manufactured Iron.**—The market is irregular. We quote at works:

Staff. Ord. Marked Bars	7 10 0 @	5 10 0
Medium	6 0 0 @	6 10 0
Common	5 10 0 @	5 15 0

Hoops, 20 W. G. and over:

Common Best	6 15 0 @	1 0
Medium	6 0 0 @	6 7 6
Common	6 0 0 @	6 7 6

Sheets, 20 W. G. and under:

Ordinary Best	7 15 0 @	8 5 0
Common	7 5 0 @	7 15 0

Welsh Bars: 4 17 6 @ 5 2 6

**Steel Rails.**—Are a little steadier. We quote £4. 15/ f.o.b. shipping ports.

**Old Rails.**—Are unchanged. We quote Old D. H's, c.i.f. New York, £3 @ £3. 5/.

**Scrap.**—Is unchanged. Heavy Wrought is quoted £2. 10/ @ £2. 12/6, c.i.f. New York.

**Copper.**—The market is a little steadier. We quote Best Selected, £52 @ £53, and Chili Bars, £47 @ £47. 10/.

**Tin.**—Is a little firmer. Straits Ingots, spot, £79 @ £79. 10/, and futures, £79 10/ @ £80. 5/.

**Tin Plates.**—Are firmer. We quote:

Tin Plates, 10x14, 1st qual. Charcoal	19/6 @	21/6
" 2d "	18/6 @	19/
" 1st " Coke	17/6 @	18/
" 2d "	13/6 @	14/6

**Spelter.**—The market is unchanged. We quote Ordinary, at shipping ports, £13. 17/6 @ £14.

**Lead.**—The market is unchanged. We quote Common English Pig, £10. 12/6 @ £10. 17/6.

**Freights.**—Steam from Glasgow to New York, 1/6.

## Financial.

Office of The Iron Age.

WEDNESDAY EVENING, February 25, 1885.

Unpropitious weather has had its effect during the past week in all departments of trade, causing interruption of railway traffic, delaying purchases in the local markets and detaining the Atlantic steamships en route. Throughout the Northwest the blockade is yet partially in force. The export movement from all the Atlantic ports has been much restricted. For reasons indicated the speculative value of commodities has been sustained, despite the absence of an export demand, and the reopening of inland navigation not being far remote, it is suggested that no general movement may take place until the rival land and water routes are in full competition.

The Stock Exchange market during the past week has shown unexpected strength, but on a reduced volume of business. Clique operations have been visible throughout, lifting the several specialties each in turn. Reports respecting Lake Shore difficulties—one to the effect that a Vanderbilt syndicate is buying up the bonds—had their full share of influence. On Thursday Lake Shore and New York Central advanced under buying on London account, and Northern Pacific was stronger on reports favorable to its financial condition. On Friday and Saturday prices were irregular. Monday was a holiday. On Tuesday prices advanced in sympathy with a rise in London, attributed to increased confidence in American securities. To-day prices generally dropped 1/4 @ 1/2. We quote as follows: Burlington and Quincy, 121 1/2; Canada Southern, 33; Central Pacific, 34 1/2; Lackawanna, 123 1/2; Delaware and Hudson, 79 1/2; Erie, 13 1/2; East Tennessee, 3 1/2; Kansas and Texas, 76 1/2; Lake Shore, 67; Lou., New Albany and Chicago, 24; Manhattan consolidated, 76 1/2; Missouri Pacific, 92 1/2; New York Central, 94 1/2; Jersey Central, 38 1/2; Northwestern, 95; Oregon Railway and Navigation, 66 1/2; Pullman Palace Car, 114; Reading, 17 1/2; Rock Island, 113 1/2; St. Paul, 73 1/2; Texas and Pacific, 12 1/2; Union Pacific, 48 1/2; Western Union, 59 1/2; Canadian Pacific, 40; Illinois Central, 124 1/2; Manitoba, 89 1/2.

United States bonds closed as follows:

U. S. 3 per cents.	101 1/2	Asked.
U. S. 4 1/2, 1891, coupon	112 1/2	113 1/2

U. S. 4s, 1897, coupon	125 1/4	125 3/4
U. S. Currency 6s, 1886	127	—
U. S. Currency 6s, 1890	127	—
U. S. Currency 6s, 1897	129	—
U. S. Currency 6s, 1898	132	—
U. S. Currency 6s, 1899	134	—

The conjectures variously expressed in regard to an extra session of Congress and the perplexing state of the silver question are alike sources of disturbance. The Sundry Civil bill, as reported to the House on Monday, contains a silver clause which may give rise to protracted debate, with uncertain results. The clause referred to provides:

"That the Secretary of the Treasury is hereby authorized, in his discretion, to suspend in whole or in part from July 1, 1885, to June 30, 1886, inclusive, the execution of so much of the act of February 28, 1878, as authorizes and directs the Secretary of the Treasury to purchase from time to time silver bullion to an extent not less than \$2,000,000 worth per month, nor more than \$4,000,000 worth per month, and which directs the coinage of the silver bullion so purchased into standard silver dollars, and which appropriates a sufficient sum of money from the Treasury to carry out the provisions of said act in these respects."

The bank reserves are still running down, from which it is inferred that considerable amounts have been invested in various securities. The falling off within the last two weeks is nearly \$5,000,000. The surplus reserve now stands at \$49,712,850, against \$19,761,350 at the same time last year, and \$1,209,000 at the corresponding date in 1883. The loans show a loss this week of \$1,221,800, and there was a contraction of \$4,869,900 in deposits. Money is rather more active, with the drift of exchange in favor of this city. The abundance of money seeking employment was indicated by the continued purchase of sterling exchange for investment, the effect being to secure higher rates of interest by a transfer of balances to London. In the West the demand for money is small, but merchants, according to the Chicago Tribune, "generally expect a fair volume of exchanges in the spring, and a far better record as to sales and profits in 1885 than they had in 1884. The absence of bad failures is a feature that gives courage to many people who would not see any light so long as mercantile and financial concerns were dropping all around them."

In the general market, as already intimated, the snow embargo operates unfavorably. The absence of buyers noticed by dry-goods jobbers is felt to some extent in other departments, although the unprecedentedly low rates of railway fare favors buying in person rather than by mail or telegraph. It is remarked that since the opening of last November nearly 50,000 packages of manufactured cottons have been shipped to foreign countries, or nearly double the quantity of any corresponding period.

The imports of foreign merchandise at this port during the past week were \$150,000 above those of the previous week, owing to the arrival of overdue steamers. The total was \$7,890,770, of which \$4,685,102 was general merchandise, and the remainder, \$3,205,668, dry goods. Since January 1 the total reaches \$55,510,278, compared with \$68,351,639 for the corresponding period of 1884. The imports of dry goods alone for the period last named were \$16,205,000, against \$23,108,000 for the same time in 1884. The export movement of domestic produce from this port continues on a very moderate scale, the total for the past week being \$5,417,915, against \$5,264,482 for the same week last year. Since January 1 they aggregate \$53,705,770, compared with \$18,505,367 for the corresponding period of 1884. According to the Custom House reports, the receipts of specie for the week were \$360,426, making a total of \$3,145,817 since January 1, and the exports of specie for the same time were \$566,338, making a total of \$5,213,109 since January 1.

Fisk & Hatch announce the discontinuance of business, preparatory to a dissolution of partnership.

The Coffee Exchange will remove to the old Cotton Exchange building about May 1.

Receiver Wilkinson, of the defunct Newark Savings Institution, has assets sufficient to have a surplus of \$80,000 after discharging all obligations.

B. G. Clark, President of the Thomas Iron Company, and Charles Dillingham have been appointed receivers of the Houston and Texas Central at the suit of the Southern Development Company.

The aggregate deposits of the savings banks of this State on January 1 were \$505,927,496, which is an increase of \$6,734,200 since January 1, 1884. One-third of the amount is invested in bonds and mortgages, one-third in United States bonds, one-quarter in municipal and State bonds, and the rest in real estate, cash and short loans. The total number of depositors is 1,165,174, and the average of deposits \$375.14. The average interest paid on deposits during the year was 3.44%.

## Chicago.

Office of The Iron Age, 36 and 38 Clark St., (Cor. Lake St., Chicago, February 25, 1885.)

The general quietness which has characterized all lines of trade for the past month still exists, but with less severity than a week ago. The movement of freight continues to be irregular both east and west of the city. Large quantities of goods from the East are yet detained between here and the Ohio River. In Northern Iowa, Ne-

braska, Minnesota and portions of Wisconsin the constant drifting of snow and continued cold makes the movement of teams an arduous task. Very little effort is made to move dead freight, and live freight at many places is refused. In the rural districts farmers are burning corn for fuel are not able to market their wheat; have no money, and therefore collections are slow and buying greatly interfered with.

**Hardware.**—The difficulty encountered in shipping and the general condition of the weather keep this market still in a depressed condition. The demand for Shelf Hardware for the season is fairly active, while that for Heavy Hardware and Railroad Supplies is steadily improving. No important change in price has occurred during the week.

**Barb Wire.**—The market has considerably strengthened since our last report, under the influence of the recent meetings of manufacturers. It is conceded that the demand for Barb Wire will be greatly in excess of stocks of spring trade. Manufacturers are not seeking orders, neither are they making quotations on anything except for immediate acceptance, and in all cases have withdrawn former prices. This has somewhat alarmed the consumer, and has given jobbers an opportunity of advancing their price 1/2¢. They now quote 3 3/4¢ @ 4 1/4¢ for Painted and 1¢ extra for Galvanized in carload lots, and 1/2¢ off these prices for less than carload lots.

**Nails.**—The Nail market continues steady under the recent advance. The ruling quotation continues to be \$2.25, 2¢, 60 days, in carload lots, and \$2.30 for Steel, with 5¢ added for delivery from stock in small lots. One of the jobbers reports that they have 2500 kegs on the road, and it is their opinion that other jobbers have also stocks delayed. Nail mills in this locality report orders sufficient to keep them running for several months.

**Ore.**—Agents of Ore companies have been more active within the last week or 10 days. Furnacemen are still dissatisfied with prices asked, and show no disposition to accept figures except through actual necessity. So far as can be learned prices have not yet been definitely settled, and considerable range is given to quotations in carload lots.

**American Pig Iron.**—Nothing of importance has occurred during the week. Prices continue to be fairly well supported for carload lots, which constitute the greater portion of the demand. Several contracts have been closed, one for 1000 tons of Lake Superior Charcoal, Nos. 1 and 2, equal to \$20.50, four months, Chicago, and two others, aggregating from 700 to 1000 tons, on private terms. Should a revival of business occur shortly the increased consumption will rapidly absorb the accumulated stock and give better tone to the market, which at present lacks buoyancy. Nos. 1 and 2 Lake Superior Charcoal iron continue to be quoted \$20.50, four months; No. 3 at \$21.50, and Nos. 4, 5 and 6 at \$22.50, as heretofore. There is no change in Lake Superior Coke Irons, which are quoted at \$20 @ \$21.

Cinder-Mixed Irons are steady at former quotations. There is no change in Lake Superior and Ohio Mixed, either in condition or price, which is \$20.50; Ohio Standard Black Bands are scarcely called for, and No. 1 is nominally quoted at \$21. In the absence of sales it is difficult to say whether this would be a fair quotation. Union Bessemer is quoted at \$19.50 for No. 1 and \$18.50 for No. 2. Southern Irons have been rather quiet during the week. No. 2 continues to be quoted at \$17 in carload lots, while sales are reported at 50¢ below this figure. The supply of Forge Iron has been largely withdrawn from the market on account of the sale of 20,000 tons in St. Louis within the last 10 days. The figures on this sale could not be obtained. The sharp demand which has recently sprung up in the Pipe trade has greatly improved the demand for the low grade of Southern Iron.

**Scotch Iron.**—Market dull and quiet, and Summerlee still quoted \$25.50 from yard.

**Merchant Steel.**—There are no new features in this trade during the past week. Plow Steels are weak and competition strong. Our quotations for Best Refined grades from store remain the same as last week.

**Steel Rails.**—Market irregular and quiet, and very little demand for even small lots. Buyers show no disposition to contract, though several new roads, it is reported, will be built during this year. Makers continue to quote \$29 @ \$30, which is about bottom figure. The buyers of the 10,000-ton lots reported to have been sold in this market are unknown, and makers question the truthfulness of the report.

**Old Rails.**—No change in price. Holders are asking about \$18; buyers are unwilling to meet their demand. Mills are quoting from \$17 to \$17.50, one purchase having been made at the latter figure recently.

**Structural Iron.**—The quantity of small orders has somewhat improved, and the inquiries for contract work are becoming more numerous. Everything at present points to a more than average trade in Structural Iron, and special interest is taken in the price likely to prevail. We continue our former quotations, with the exception of that on Beams and Channels, which are now quoted at \$3.10, 50¢ below former price, and T Iron, \$3; Angle Iron, \$2.50; Flitch Plates, \$2.50; Frieze Plates, \$2.70; 1/2¢ @ 1/2¢ is added for delivery from stock. No other

change was made at the meeting of the combination last week, so far as learned.

**Bar Iron.**—The position of the market is about the same as it has been for some weeks past. The demand continues to be fair. Prices are in the makers' favor as a rule. Best Refined Iron is quoted at 1.8¢ rates from store, with the usual concessions from mill. Common is nominally quoted at 1.6¢ rates from mill.

**Norway Bars.**—Market quiet; very little demand for Foreign Iron; quotations still range \$3.75 to merchant trade in carload lots, and \$4 rates to local trade.

**Galvanized Iron.**—The inactivity of the market in Galvanizing Iron makes it scarcely worth mentioning. We continue the following quotations as jobbers' nominal prices: Juniata, 57¢ discount; Charcoal, 60¢ discount, and Refined, 62 1/2¢ discount from list.

**Black Sheets.**—No features of importance in the last week. Jobbers' price, from store, remain unchanged, as follows: Nos. 8 to 14 at \$2.50 @ \$2.60; Nos. 15 to 17 at \$2.80 @ \$2.90; Nos. 18 to 20 at \$2.80 @ \$2.90; Nos. 22 and 24, \$2.80 @ \$2.90; Nos. 25 and 26, \$2.90 @ \$3; No. 27, \$3 @ \$3.10.

**Old Wheels.**—The firmness noted in this market last week is still supported, and there are numerous inquiries for Wheels. A cash offer from brokers would be about \$15 @ \$15.75, and it is possible that some foundrymen would be willing to increase this price 50¢ @ \$1 on special lots.

**Scrap Iron.**—No. 1 Mill Scrap is quoted at \$14.50; No. 2 Mill, \$9.50, Chicago delivery, and No. 1 Forge, \$17, by rolling mills. There are some inquiries for good sized lots, but those who have the Iron are unwilling to sell at the price offered. We make the following quotations as dealers' purchasing prices from store: No. 1 Wrought Scrap, 1/2¢ net ton, \$13.50 @ \$14; Cast Scrap, 1/2¢ net ton, \$11.50 @ \$12; No. 1 Stove-Plate Scrap, 1/2¢ net ton, \$9; Wrought Turnings, 1/2¢ net ton, \$9; Cast-Iron Boring, \$7; Old Plow Steel, \$8; Tool Steel, 1/2¢ net ton, \$15; Locomotive Steel Tire, 1/2¢ net ton, \$12; Buggy Springs, 1/2¢ net ton, \$14; Malleable Scrap, \$6.

EVERETT & POST, 156 Lake street, Chicago, report to us as follows, under date of February 23, 1885: **Pig Lead.**—During the past week the several Lead markets have shown signs of weakness. Owing to the severe storms, trade in most lines has been suspended, which had its effect on Pig Lead. There seems to have been an understanding among several refiners not to quote below \$3.50, Chicago or St. Louis, but some outsiders, not being in the ring, and getting tired holding, quietly let go 400 tons here at \$3.42 1/2 @ \$3.45 basis for March. St. Louis followed in the wake by sales of 500 tons Refined at \$3.45 for local consumption, and 600 tons Common at \$3.35 @ \$3.37 for shipment East. Just what effect these sales will have on future prices remains to be seen. With a revival in trade, we will no doubt see higher prices, and when the turn comes it will be quick, and we advise our friends to be on the lookout, and not hold off too long. New York closes quiet and dull at \$3.60 @ \$3.62 1/2 asked.

## Coal Market.

The demand for Anthracite Coal is active, but prompt deliveries are well-nigh impossible until harbor navigation improves. Nor can much improvement be expected in the Eastern trade while the rivers and Sound are obstructed. Prices are well indicated by the circulars, as Coal cannot be had for less. Under no conditions will the companies receive orders and guarantee delivery at once. While this continues many offers to buy will be declined. Quotations are as follows: Grate, \$3.35 @ \$3.75; Stove, \$4.15 @ \$4.20; Nut, \$3.65 @ \$3.70.

The Bituminous trade, for reasons given above, is sluggish, but prices are firmly held, as follows: Cumberland, at Baltimore, \$2.50; at New York, \$3.25; Clearfield, \$3 at South Amboy. The details of the Bituminous Coal pool have all been agreed upon and the new rates will go into effect on March 1. It is said that not only are very low figures being offered, but that large contracts with railroads, manufacturers and Transatlantic steamship companies in New York and the East have already been closed at prices far below "pool" rates, and for delivery at any time during the season.

The details of the Coke-pooling arrangement have been settled and the agreement signed by the Pennsylvania Railroad, the Pennsylvania Company, the Baltimore and Ohio and the Lake Shore and Michigan Southern railroads. The prominent features of the old pool are retained.

The total amount of Anthracite mined thus far in the year 1885 is 2,661,570 tons, compared with 2,854,872 tons for the same period last year, a decrease of 222,302 tons. The total amount of Bituminous sent to the Eastern markets thus far in the year 1885 is 530,739 tons, compared with 539,138 tons for the corresponding period last year.

At a meeting on Tuesday of the Lehigh and Schuylkill Coal exchanges, tolls on all Anthracite Coal, except Pea, were reduced 20¢ per ton, and on Pea 40¢ per ton. Prices were likewise reduced 15¢ on all sizes except Chestnut, and on this 10¢.

## Baltimore.&lt;/



# Trade Report.

## New York Iron Market

**American Pig.**—The market has been quiet and dull, without any features to distinguish it from its predecessors. There is no marked pressure to sell, except that possibly some outside Irons are offered at the usual range of concessions to tempt buyers. Some of the leading makers of Lehigh Irons are still trying to book orders. In the aggregate the small purchases made represent a fair trade. The representatives here of the Victoria Furnace, of Virginia, Messrs. H. W. Adams & Co., question the accuracy of the report circulated through the daily press that that furnace has decided to blow out in consequence of an overstock. The report has very likely grown out of an misunderstanding due to the fact that probably mining has stopped in consequence of a large stock of ore. The furnace was carrying very little Pig Iron indeed. We continue to quote standard brands of Lehigh and North River Irons, tidewater delivery, as follows: No. 1 X Foundry, \$18 @ \$19; No. 2 X Foundry \$17 @ \$18; Gray Forge, \$16 @ \$17. The outside figure is asked for special brands. Outside brands sell for 50¢ @ \$1 less than our quotations.

**Scotch Pig.**—Business has been very quiet. There is considerable Iron now afloat, but the bulk of it is sold. Nominal quotations for 5 and 10 ton lots are as follows: Coltness, \$21.50 to arrive; Gartsherrie, \$21 to arrive, \$22 from yard; Shotts, \$21.50 to arrive, \$22 from yard; Langloan, \$21.50 to arrive, \$22 from yard; Carnbroe and Glengarnock, \$19.50 to arrive, and \$20.50 from yard; Summerlee, \$20.50 to arrive; Dalmeilington, \$19 @ \$19.25 to arrive; Eglington, \$18.50 @ \$19 to arrive; Clyde, \$19 @ \$19.25 to arrive. On large lots concessions are made.

**Bessemer Pig and Spiegeleisen.**—There has been no business of any consequence either in Bessemer Pig or Spiegeleisen. We quote the latter, nominally, \$25.50 @ \$26 for 20%, and \$30 for 30%.

**Bar Iron.**—Some of the mills have full work and are consequently little inclined to meet buyers' views. Others are eager for orders, so that there is little difficulty in covering requirements at current rates. There is a good deal of complaint of a growing practice of selling what is really Common Iron for Refined Bar, consumers evidently being tempted by the low figures. Well-known grades of Refined Bar are not selling below our quotations, which are represented by the following range: Common Iron at mill, 1.4¢ @ 1.6¢; from store, 1.6¢ @ 1.9¢; Best Refined at mill, 1.65¢ @ 1.9¢; from store, 1.9¢ @ 2¢.

**Structural and Shaped Iron.**—The details of the arrangements among the beam manufacturers were completed last week. The association now includes all of the makers, Messrs. Jones & Laughlins, of Pittsburgh, having joined some weeks ago. The St. Paul bridge, referred to in our last issue, was secured by the Passaic and the Edgemoor works, the quantity required being about 1000 tons. Altogether, there is a good deal of work of this kind pending, among others being a bridge for the city of Boston, which will call for \$250,000 worth of Iron-work. Quotations for small lots continue to be nominally as follows: Angles, from mill, 2.1¢ @ 2.15¢; from store, 2.3¢ @ 2.6¢; Tees, from store, 2.8¢ @ 3¢. Beams and Channels are 3¢ on dock for all orders.

**Plates.**—Business continues very quiet indeed, transactions being on a moderate scale. Usual prices of Iron Plates are as follows: Common or Tank, 2.2¢ @ 2.3¢; Refined, 2½¢; Shell, 2½¢ @ 2¾¢; Flange, 3½¢; Extra Flange, 4¢ @ 4¼¢; Tank and Bridge Plate from mill, 2.05¢ @ 2.1¢. For small lots of Steel Plates the quotations are as follows: Ship, 2¼¢ @ 3¢ at mill; Tank, 3¢ @ 3½¢ on dock; Boiler, 3½¢ @ 3¾¢ for Shell, 4¢ @ 4½¢ for Flange, and 4¾¢ @ 5½¢ for Extra Flange and Fire-box.

**Sheet Iron.**—The season for some classes of buyers has not yet set in and the market is still dull. We quote prices of Sheet Iron in our list of New York Wholesale Metal Prices.

**Merchant Steel.**—A fair quantity of Steel is selling from warehouse at figures which are somewhat irregular: Nominal quotations are as follows: American Tool Steel, 8¢ @ 9½¢; Tool Steel of special grades and finer qualities, 12¢ @ 20¢; Crucible Machinery, 4.5¢ @ 6¢; Spring and Tire, 2¼¢ @ 3¼¢; Open-Hearth and Bessemer Machinery, 2¼¢ @ 3¢; English Tool, 13½¢ @ 15¢.

**Steel Rails.**—We do not hear of a single transaction, and even small lots do not appear on the market. Nominal quotations vary between \$27 and \$28 at mill. In the absence of any business, it is impossible to judge whether and to what extent the lower figure would be shaded for large lots.

**Steel Wire Rods.**—Nothing has occurred to dispel the dullness, and Foreign Rods are still nominally quoted \$43 for the better qualities, though it is probable that concessions would be made for round lots.

**Old Rails.**—We are reported two or three sales of fair lots, one of them for delivery at a point in the western part of this State. The price named in one of these lots was low. We quote \$16.50 @ \$17.

**Scrap Iron.**—The market has been quiet, but firmer. We quote from yard \$18 @ \$18.50.

## Philadelphia.

Office of The Iron Age, 220 South Fourth St., Philadelphia, February 24, 1885.

**Pig Iron.**—The demand for Pig Iron shows no improvement, and, while prices of standard brands are well maintained, others are inclined to droop a little. Leading Pennsylvania companies entered a large amount of business some time ago, so that they are in no danger of accumulation, notwithstanding the paucity of demand during the past few weeks. Outside brands are pressed for sale with more urgency however, and in some quarters the market is probably a shade weaker than it was 10 or 15 days ago, although there is no reason to suppose that there will be any quotable change in prices. Consumption has not met the expectations of many sanguine parties in the trade, neither is there anything in the outlook that seems to indicate any marked improvement in the immediate future. The chances are that a fair business will be done during the spring and early summer months, but the supply of Pig Iron, even at the present rate of production, bids fair to be ample for all requirements, unless something unforeseen occurs. At the same time, there is reason to believe that the extreme limit of contraction has been reached, and improvement is merely a question of time. How long it may be in coming or to what extent it will be realized cannot be predicted by any one, but the conditions appear to be favorable. Stocks are low, prices are low, and the financial condition of the country is sound; so that a fair start is about all that is necessary to set things in motion. Meanwhile buyers are as cautious as ever, taking only just what they require from time to time, their conservatism being increased to some extent, perhaps, by the urgency of sellers, which creates the impression that supplies are larger than they really are. Buyers form their ideas of the condition of the market by what is offered to them, and their opinions are not likely to change until the offerings are more in proportion to the demand. Sales during the week have been at \$16, \$17 and \$18, delivered, for the three grades of standard brands of Pennsylvania and Virginia Irons, and at about \$1 ½ ton less for Alabama Irons. Special brands command the usual premium of about \$1 ½ ton, and in a similar way brands new to the market or not fully up to grade have to be shaded according to circumstances. The weak spots in the market are found chiefly in the last-named class of Iron, quotations on really good brands being well maintained.

**Foreign Iron.**—Some little business has been done during the week, probably 4000 to 5000 tons of Bessemer and Spiegel, all told. Ordinary brands of Bessemer could be had at from \$18 to \$18.50, but the demand appears to be for special brands at from \$19 to \$19.50, Philadelphia or Baltimore. Spiegel sold at a trifle over \$25 for a 2000-ton lot of 20%.

**Blooms.**—Market very quiet; best makes held at quotations as follows: Charcoal Blooms at \$52 @ \$53; Run-out Anthracite, \$43 @ \$44; Scrap Blooms, \$35 @ \$36; Northern Ore Blooms, \$35.

**Muck Bar.**—Demand limited and prices irregular. Sales in small lots at from \$27 to \$28, delivered, according to quantity, quality, &c.

**Bar Iron.**—A fairly active demand is reported in small lots, but it is still a difficult matter to keep the mills employed to more than half their capacity with the business obtainable from week to week. A few large orders distributed around would be a wonderful help, but as matters now stand there is nothing to fall back upon; hence every little order is competed for at a rate that forbids all chance of prices improving. The outlook is not materially different to what it has been for some weeks past, but the feeling is hopeful, and there is little doubt that the change, when it does come, will be for the better. Prices about as last quoted, viz.: 1.8¢ for Best Refined Bars; 1.65¢ @ 1.75¢ for medium grades, and 1.5¢ @ 1.6¢ for Common Iron.

**Plate and Tank Iron.**—Business has been of the same limited character as reported for several months past; orders are chiefly for lots of 10 to 50 tons each, and these not very abundant. The outlook seems to be a little better however, and the mills have gained something during the week beyond what they have turned out. At the same time there is the usual anxiety for business, and prices can be shaded on orders of good size. The usual quotations are about as follows: Ordinary Plate, 2¢; Tank, 2.1¢ @ 2.2¢; Shell, 2.5¢; Flange, 3.5¢; Fire Box, 4.25¢; Steel Plates, Flange, 3.5¢ @ 3.75¢; Fire-Box, 4.25¢.

**Structural Iron.**—The only order of importance during the week was one of 2500 tons for bridge building, the contract having been closed by the St. Louis and San Francisco Railway for a bridge across the Arkansas River. This contract has been on the market for some time, but orders for the material were given out only last week. There is a similar order for several hundred tons from another company, which is likely to come on the market in a few days, but beyond that there is very little doing. A large order for Beams for architectural purposes may be out soon—2500 tons, it is said—but the matter is rather indefinite as yet.

The week's business shows some improvement, nevertheless, and the outlook is more encouraging than it has been for some time past. Prices are unchanged, however, and remain as last quoted, viz.: 2¢ @ 2.1¢ for Angles, 2.1¢ @ 2.15¢ for Bridge Plate, 2.5¢ for Tees, and 3¢ for Beams and Channels.

**Sheet Iron.**—The demand for Thin Sheets is very limited and prices much the same as they have been for several weeks past, irregular and unsatisfactory. Thick Sheets are doing a little better, orders being of a more general character than usual, showing a very fair consumption in some quarters. Small lots are quoted at about the following figures:

Best Refined, Nos. 26, 27 and 28.....	3½¢
Best Refined, Nos. 18 to 25.....	3¼¢
Common, ¼¢ less than the above.....	
Best Bloom Sheets, Nos. 26 to 28.....	5.5¢
Best Bloom Sheets, Nos. 22 to 25.....	4.5¢
Best Bloom Sheets, Nos. 16 to 21.....	4.¢
Blue Annealed.....	2.4¢
Best Bloom, Galvanized, discount.....	57½¢
Second quality, discount.....	60¢
Common, discount.....	62½¢

**Wrought-Iron Pipe.**—The demand is improving, and the indications in that respect are rather encouraging. Prices show no improvement, however, and discounts vary according to circumstances, although the ordinary rates are as follows: Butt-Welded Black Pipe, 50¢; Butt-Welded Galvanized, 35¢; Lap-Welded Black, 67½¢; Galvanized, 45¢; Boiler Tubes, 60¢.

**Steel Rails.**—A little more activity is reported, but prices are still very irregular. In ordinary cases about \$27.50 at mill is quoted, but on large lots and favorable dates for delivery \$27 would be accepted, and possibly less, by mills that are not well supplied with orders. Price depends upon circumstances, and it is difficult to do anything more than give a general idea of the market, unless accompanied by full details of each transaction, which is obviously impossible.

**Crop Ends.**—There is not much demand, although English Crops could be had for shipment at \$18 @ \$18.50, and Welsh at from \$17 to \$17.50.

**Old Rails.**—There is more inquiry, but owing to scarcity no business has been done for some time. Holders ask \$17.75 @ \$18 for shipments from Southern ports, with bids of \$17 @ \$17.25 for 1000-ton lots. Bull Heads are offered at \$20, with bids of \$18.50 on 1000-ton lots. The market has a firm tone, and appearances indicate that buyers will advance their bids, as Rails are wanted in several directions. For deliveries in the interior \$18.50 @ \$19 asked, with bids slightly below those figures.

**Old Material.**—The tone of the market is improving, and prices are firm at last week's quotations, according to quality, point of delivery, &c.: No. 1 Wrought Scrap, \$17 @ \$18; No. 2 do., \$12 @ \$13; Horse Shoes, \$22 @ \$22.50; Turnings do., \$13 @ \$14; Old Car Wheels, \$15 @ \$16; Old Steel Rails, \$15.50 @ \$16; Fish Plates, \$22; Cast Scrap, \$13.50 @ \$14; do. Turnings, \$9.50 @ \$10.

**Nails.**—There is no change in prices, which are steady at \$2.30. Stocks are unusually light, and firm, if not higher, prices appear to be assured for some time to come.

## Pittsburgh.

Office of The Iron Age, 77 Fourth Avenue, Pittsburgh, Pa., February 24, 1885.

There has been little or no change in the general business situation during the past week, but in some respects the outlook is favorable for an early improvement. The extremely cold weather tends to curtail business. Traffic and travel throughout the Northwest are still badly impeded by the snow and ice, and while this continues no improvement in the demand for manufactured goods can be expected.

There has been nothing important developed in labor matters during the week; the situation is unsettled and unsatisfactory, and there is still an army of unemployed men hereabouts. Conventions of the several districts of the Amalgamated Association will be held on April 4, when delegates will be elected to the scale convention which meets in this city on April 15. At both of these conventions the wage question will be the leading topic of discussion. At the last-named convention a conference committee will be appointed to confer with a similar committee of manufacturers in regard to the scale to be paid Ironworkers the coming year. What the outcome of this conference will be is difficult at present to foretell, but it appears to be pretty generally conceded that there will be a reduction.

Messrs. Graff, Bennett & Co., who got into trouble a couple of years ago, and asked for and obtained an extension, after paying 40% of their indebtedness have been obliged, owing to the continued depression in the Iron business, to ask for an extension on their next payment, now about due, and it will no doubt be granted. In regard to the Oliver Bros. & Phillips matter there is nothing new to note. The extension, it is said, has been obtained.

Natural-gas accidents are still of frequent occurrence, and a pretty strong feeling is being developed against the general introduction of the gas into the city. Those, however, who are well informed on the subject claim that the natural is no more dangerous than the artificial gas, and that the accidents have been the result of poor pipe and inferior workmanship. Some of the pipe laid is being taken up and replaced with a better article, and a good deal more care is being taken in the work-

manship. It is stated that the well being put down at the Iron works of Jones & Laughlins will not be abandoned until a depth of 3000 feet has been obtained, it being the intention of the firm to make a thorough test. The National Tube Works at McKeesport have laid a pipe from their works to a well they own in the Murrysville district, some 12 miles distant, and it is expected they will be supplying their works with gas within a few days.

**Iron Ore.**—Some representatives of the Lake Ore companies have been here within the past week, and it is evident that they are getting a little restless. The season is pretty well advanced, with but very few, if any, contracts having been made, and so far as we can learn, there is little disposition on the part of consumers hereabout to buy beyond their immediate wants.

**Pig Iron.**—There has been nothing particularly new developed during the week under review. There is a fair, possibly an increasing, volume of business, but the market continues in an unsatisfactory condition. It is believed, however, notwithstanding the very unsatisfactory condition of the market, that prices, especially for good qualities, are as low as they will go, and it is worthy of mention that some furnacemen are refusing to sell at current rates, although consumers have no trouble in obtaining all they need for present use within the range of our quotations. It is doubtful whether any of the furnacemen here would be willing to contract for April or May delivery at present prices. With even a perceptible improvement in the demand an advance of from 50¢ to \$1 ½ ton might be established on the better grades, as consumers generally have very light stocks. Many of them have been buying from week to week all winter, as their immediate necessities require. We quote prices as follows:

No. 1 Foundry.....	\$17.50 @ \$18.00, 4 mos.
No. 2 Foundry.....	16.00 @ 17.00, 4 "
Neutral Gray Forge.....	15.50 @ 16.00, 4 "
All-ore Mill.....	17.00 @ 17.50, 4 "
White and Mottled.....	14.00 @ 15.00, 4 "
Warm-Blast Charcoal.....	18.00 @ 22.00, 4 "
Cold-Blast Charcoal.....	25.00 @ 27.00, 4 "
Bessemer Iron.....	17.75 @ 18.00, 4 "

We can report a sale of Close Gray Forge at \$14.50, cash, and Bessemer Iron at \$18, four months. Also, 500 tons of Gray Forge, an outside and unknown brand, was reported at \$15.25, four months. City furnaces are nearly all asking \$15.50, cash, to \$16, four months, for their No. 1 Forge, and refusing to sell for less. It is claimed that Bessemer Iron can be bought at \$17.50, four months, but, so far as we know, there have been no sales made below \$17.75, four months.

**Muck Bar.**—There is no improvement in the demand, and in the absence of sales we repeat former quotations, \$27 @ \$27.50, cash.

**Manufactured Iron.**—The demand for all kinds of Finished Iron continues exceedingly light for the season, and no improvement can reasonably be expected as long as the Northwest is frozen and snowed up, as it has been the greater part of the winter. It is probable that after the weather moderates so that railway traffic can be resumed and outside work commenced there will be an improved demand. Prices are still quoted on a basis of 1.65¢ @ 1.75¢ for Bars, 60 days, 2¢ off for cash. These quotations are for first-quality Iron.

**Nails.**—The demand has fallen off within the past two weeks, as it was expected it would, in view of the recent sharp advance in prices. Large Western and Southern buyers are now holding off to ascertain whether the advance is likely to be maintained. So far as we can learn, manufacturers are holding firm, and the indications are that the break anticipated by many of the jobbers will not take place. We repeat former quotations, \$2.25, 60 days, 2¢ off for cash, with a rebate of 10¢ per keg on carload lots and upward. Manufacturers of Steel Nails continue very confident that the Steel is destined to supersede the Iron Nail.

**Wrought-Iron Pipe.**—The demand continues light, and is chiefly for small lots, but an increased business is confidently looked for just as soon as the weather moderates so that outside work can be resumed. Prices remain unchanged, and it is believed they are as low as they are likely to go. Discounts on Black Butt-Welded Pipe, 1½-inch and smaller sizes, 47½¢; Galvanized do., 40¢; Black Lap-Welded, 1½-inch and larger sizes, 65¢ @ 67½¢; Galvanized do., 47½¢ @ 50¢; Selected Pipe, or Pipe cut to specified lengths, discount 5¢ less than the rates above quoted. Discount on Boiler Tubes, 60¢; 2-inch Oil-well Casing, 11¢ per foot, net; 5½-inch Oil-well Casing, 37¢ @ 38¢ per foot, net.

**Steel.**—The Merchant Steel trade is reported more active, but no improvement in prices. Standard brands Refined Cast Steel, 9¢; do. Crucible Machinery, 4¼¢; do. Open-hearth and Bessemer, 3¢. Steel Nail Slabs, \$30 per ton, free on cars at works.

**Steel Rails.**—Continue very dull here, but it is hoped that there will be an improved demand within a few weeks. Heavy Sections, in the absence of sales, may be quoted at \$26.50 @ \$27, cash, at works. A mill at Chicago sold 5000 tons recently at \$29.25, cash, there, which is equal to about \$26.75 here.

**Old Rails.**—There has been a good deal of inquiry within the past week or two for Old Iron Rails for immediate delivery, and with a very scant supply prices are higher. The Fort Wayne Railroad Company are reported as having sold a lot to a Youngstown mill at \$20.25, delivered there. For future delivery there are no buyers here that we can

hear of above \$18, at which price 500 tons were sold for March two weeks ago; this sale, as we understand, gives the seller the option of all the month to fill his contract. Old Steel Rails are still quoted for immediate delivery at \$15.50 @ \$16.50, according to length.

**Crop Ends.**—Steel Rail Ends are in small supply, and for a present delivery may be quoted at \$17.50 @ \$18. Steel Bloom Ends, \$17 @ \$17.50.

**Railway Track Supplies.**—There is but little inquiry and prices remain nominally unchanged. Spikes, 2¢, 30 days, delivered. Splice Bars, 1.6¢ @ 1.7¢; Track Bolts, 2.35¢ @ 2.4¢ with Square and 2.6¢ @ 2.65¢ with Hexagon Nuts.

**Scrap.**—No. 1 Wrought Scrap, \$16 @ \$17, net ton; Old Car Axles, \$24 @ \$25; Wrought Turnings, \$13 @ \$14; Cast Borings, \$11 @ \$12; Old Car Wheels, \$15 @ \$16.

## Chattanooga.

Office of The Iron Age, Carter and Ninth Sts., Chattanooga, February 23, 1885.

The past week has developed a very encouraging feeling among our furnace owners. Nearly all the product of our furnaces is taken up on orders for the next three months, at prices at which most of them are making money, but they feel indisposed to make any more contracts at present figures. Actual offers are being made to take entire products up to July 1 at present rates, and \$1 additional is the figure very freely discussed as the asking price for contracts after February 1. The fact is, most of the furnaces now running are making some money over the actual cost of production, and the outlook is of such a character that a much more hopeful feeling prevails. Notwithstanding some discouraging reports from the Pig Iron market centers, the orders and inquiries are of such a character as to justify our people in looking for better times during the present year. Some of the Southern furnaces have taken advantage of the present prices and contracted for a six months' supply, while others are ordering only from week to week. Inquiries from the East continue to be frequent, which clearly shows that they are looking to this district for a regular supply of a portion of their wants. During the next four months two of our large furnaces will go out and be thoroughly overhauled, which will probably improve both the quality and quantity of their product. Our railroads continue to be loaded down with freight, and much complaint is being made at the delays which in some cases are very annoying. Many of our manufacturers are running at their full capacity, and nearly all are running on fair time. The lumber business continues very brisk and the mills are running full.

**Pig Iron.**—The market is steady, and none of the furnaces are waiting for orders. Long-time contracts are avoided, under the firm belief that there will be an advance at an early day. A small sale was made during the week at \$13 for No. 2 Foundry to a Western point, and also a sale of 2500 tons Forge for the East at \$11.60, net cash, at the furnace, less 25¢ per ton commission. It is contended that some sales are being made at less figures, but the above sales are a very fair index of the prices of our Iron. There is some Iron that can be bought to-day at a less figure, but it is a grade and make that is not desirable for many purposes. We quote a standard article of Gray Forge at \$11.50 @ \$12.50, No. 2 at \$13 @ \$13.50, and No. 1 at \$14 @ \$14.50. The standard Car Wheel Irons continue to be in demand, and the furnaces are pretty well sold ahead at \$22 @ \$24.50, according to grade. There has been a concession in freight to some of the extreme Western points, which has enabled our furnaces to put 100 tons into those markets, which has supplied them for the present.

**Hardware.**—The continuation of very disagreeable weather has caused a continued depression in this business. Snow, frost and rain do not form an agreeable condition of weather in which to do much outside work, and very little building or farming has been done; but this will soon change, as the time of year is near at hand when both of these branches of business generally open with a boom. As a general thing, most of our jobbing houses are well stocked with everything that is likely to be required.

**Barbed Wire.**—This is an article that is growing very much in favor through the South, and the factory here is having all it can do.

**Railroad Fastenings.**—The demand for these continue good, and the works are running full on orders that will keep them going some time. We quote: Spikes (standard), 1.8¢; Splices, 1.7¢. and Bolts, 2.30¢.

**Scrap.**—There are no movements in Old Material, with the exception of Old Rails, which are selling at \$16 @ \$16.25 where sales are effected at all. These prices cannot, however, be had when shipments would have to be made a long distance.

**Ores and Coke.**—In these articles there is no change to note. Occasionally a new opening is made, and the product is immediately taken at the regular prices.

## Cincinnati.

FEBRUARY 23, 1885.—**Pig Iron.**—The past week has developed no new features in the market; the stormy and cold waves con-



proves highly satisfactory.







The Ripley Hinge Works, Ripley, Ohio, are in operation, producing Strap Hinges which are claimed to be of excellent quality. The company announce that the machinery, tools and appliances are practically those used for similar work elsewhere, differing only in an attempt at construction upon the most economical plan. They add that it would have been easier to construct if they had cared little for cost and less for income. The trade will await with interest further announcements concerning the line of goods manufactured and the prices.

We learn that in the suit brought by the Globe Nail Company against the Essex Horse Nail Company an injunction was recently granted restraining the defendants from pointing Horse Nails by the use of the Chase Reissue Patent No. 5207. This injunction is, we are informed, being strictly observed, but the company call attention to the fact that it does not prevent them from pointing their Nails by other methods, nor restraining them nor any of their customers or agents from selling their product, a large stock of which they had on hand at the time the injunction was granted, and which, with what they will be able to manufacture by other methods not covered by the patent in question, will enable them to fill all demands until the expiration of the patent on the 9th of June next. The company thus make the point that, so far as the trade or their customers are concerned, the injunction can have no injurious bearing.

Slye & Beery, Upper Sandusky, Ohio, in their advertisement on page 37, illustrate and offer to the trade their new Eureka Hog Ring. In the circular referring to this article they call attention to the special points of advantage which are claimed for it, among which are these: That never more than one Ring is required; that it will positively prevent rooting; that when adjusted it will not turn up, down or sideways; that it in no way interferes with the hog's feeding; but for further information we must refer our readers to the advertisement and circulars of the manufacturers.

The assurance of a large ice crop through all sections of the country where natural ice is harvested is referred to as giving a prospect of a large trade in Refrigerators for the coming season, and with an early spring trade the expectation is expressed that the volume of trade in this line will be larger than it was last year.

Wm. H. H. Rogers, manufacturer of Folding Paper Boxes, 51 and 53 Leonard street, New York, introduces to the trade a novelty in the way of a Folding Nail Box. He describes it as quickly adjusted, having but two fasteners, making a neat package and saving time and time. They are made for 3, 5 and 10 pounds of Nails, and are sold at 4 1/2 cents per pound. If desired, the dealer's card is printed on two sides of the box without additional charge.

#### CATALOGUES AND LISTS.

The American Saw Company, Trenton, N. J., have issued their catalogue for 1885, showing the variety of Circular, Mill, Mulay, Gang and Crosscut Saws which they manufacture. The list also covers Circular Saw Mandrels, Swages, Hand Screw Press, Wrenches and other tools connected with this line. Their patent Inserted Tooth Circulars, which are the specialty of the company, are fully illustrated and described, cuts being given of the different forms of Tooth which are thus used. This catalogue will be of special interest to the trade because of its complete exhibit of these Inserted Tooth Saws.

Andrew Tredway & Sons, Dubuque, Iowa, issue a price list of such seasonable goods as Batcheller's Forks and Auburn Manufacturing Company's Forks, Hoes, Rakes, &c., David Wadsworth & Sons' Scythes and Handles, Snaths, Wheelbarrows, Shovels, &c. They mention that they carry in stock a full line of Heavy and Shelf Hardware, Iron Wagon Stock, Tinners' Stock, Tinware, &c.

The Grand Rapids Refrigerator Company, Grand Rapids, Mich., have issued their catalogue for the present season. They announce that they have removed to their new factory, which they refer to as thoroughly equipped. The list describes their well-known Leonard Refrigerators, and illustrates the Leonard Refrigerator Lock, to which they call special attention.

The Lockwood Mfg. Co., South Norwalk, Conn., issue their illustrated and descriptive catalogue of Door Locks, Knobs and Builders' Hardware for the present year. It exhibits, with cuts and descriptions, but without list prices, a line of Latches, Mortise Locks, Night Latches, Dead Locks, Rim Locks, Keys, Jet Door Knobs and Sash Fasteners.

The United Brass Company, 79 Fulton street and 54 Gold street, New York, have just issued their Hardware catalogue, which will be regarded by the trade with much interest. It will be seen that this company have works at Lorain, Ohio, and Haydensville, Mass., to illustrations of which two pages are devoted. The list exhibits a large line of Cocks, Bibbs and Rough Stops, as well as Air Pumps, Hose Pipes, Nozzles, Taps, Couplings, Sprinkler Supplies, &c., and a variety of miscellaneous articles connected with the same line. The book is an attractive volume, and well arranged, a feature deserving special mention being the very convenient method they have adopted of arranging their telegraphic code. Instead of presenting it as a table, they have printed each code word, in red ink, under the price of the article it refers to. By this plan the trouble of looking up the designating word

is entirely obviated, thus saving both time and labor to the purchaser. The book is very fully illustrated, and the cuts are excellent.

R. Armiger & Son, No. 10 South Charles street, Baltimore, Md., have issued a catalogue of their Refrigerators and House-Furnishing Specialties. They call particular attention to their "Alpine" Refrigerators, which they now furnish with porcelain-lined water tanks, and also their Walnut Buffet and Sideboard Refrigerators. Their "Climax" Refrigerators, of which they make seven different styles of various sizes, are furnished with sideboard backs when desired, making an attractive piece of furniture. The special merit claimed for these Refrigerators is that they are self-purifying, and are so arranged that no drip-pan is required, all the water being collected and utilized in the water cooler. A new Refrigerator, the "Climax," is represented in their list, an article which is made of poplar and finished in either oak or walnut color. It has porcelain-lined tanks and an extra provision chamber alongside the tank, with an opening on top. They are described as well made and finished, having good locks and knobs and furnished with white porcelain casters.

The catalogue and price list of the S. Obermayer Foundry Supply Mfg. Co., Cincinnati, Ohio, has been issued for the present year. From this it appears that S. Obermayer & Co. have disposed of their business to the above company, retiring, however, only in name, the announcement being made that they have associated with themselves gentlemen who are widely known in the foundries of the United States and Canada. They call the attention of the trade to certain trade-marks which belong to them, and to which they claim the exclusive right, warning manufacturers and the trade against infringements. They announce that, in the present catalogue they present five new Facings for dusting and blacking, invented since the issue of their last list, for the quality of which they make special claims. The catalogue contains matters of interest with reference to their Foundry Packings and Blackings, and exhibits a line of Cast Steel Brushes, Foundry and Machine Shop Brushes, Molders' Tools and Implements, for more definite information concerning which we refer our readers to the catalogue.

The E. C. Meacham Arms Company, St. Louis, issue a price list, February 12, 1885, which is to supersede all their previous lists. This pamphlet covers a large and varied line of Guns, Rifles, Pistols, Cartridges, Gun Fixtures and Sporting Goods, and is an evidence of the enterprise and extensive business of the house that issues it. They also advise us that they have in stock several thousand Springfield Military Rifles, 50-70, which they speak of as adapted to military companies not having a large amount of money to put into arms, as they are sold at about \$6 each.

#### Metal Market.

**Copper.**—During the week under review the market has been featureless and quiet, sales being of a retail character merely, but prices remaining firm. We quote at the close, Lake Superior 11 1/4¢ @ 11 1/2¢, and other brands 10 1/4¢ @ 11¢. The Chili Bar market has lacked strength and steadiness, and for a couple of days went off to a figure lower than hitherto seen. The quotations were as follows: February 19, £47. 5/; February 10, £47. 2/6; February 21, £47. 2/6; February 23, £47. 5/; February 24, £47. 5/; and this morning the same figure. Best Selected has been steady, £52. Spanish export of Pyrites the first 11 months of 1884, 558,146 tons, against last year 521,060, and 533,995 in 1882; of Ingot Copper only 16,672 tons, against 21,192 in 1883, and 19,829 in 1882. Manufacturers may be nominally quoted: Bottoms, 18¢; Braziers, 17 1/4¢; Sheathing, 16¢; and Bolt Copper, 18¢. We are cabled from London this afternoon that the Copper market is a little steadier. Best Selected, £52 @ £53, and Chili Bars, £47 @ £47. 10/.

**Tin.**—London one moment last week advanced with Straits Tin to £79, cash, and £79 15/, futures, but has not been quite sustained, coming £78. 15/, cash, this morning, and £79. 10/, three months. Our own market has shown little alacrity in conforming itself to this fresh advance, and has remained sullen and expectant at \$17.60, cash, and \$17.70, 30 days. The following cablegram reaches us from London: "Market a little firmer. Straits Ingots, spot, £79 @ £79. 10/, and futures, £79. 10/ @ £80. 5/. Tin Plates.—The market has been easier, the bad weather out West checking the demand. We quote at the close, large lines, ordinary brands, do. box: Charcoal Bright, \$4.90 @ \$5.50; do. Ternes, \$4.37 1/2 @ \$4.55; Coke Tin, \$4.40 @ \$4.50; and do. Ternes, \$4.35. Liverpool is quite firm at 13/9 @ 14/4, Coke, and 15/9 @ 17/6, Charcoal. From London we are told that Tin Plates are firmer, without quotable change in price.

**Lead.**—There sold 300 tons St. Joseph's at \$3.62 1/2 @ \$3.65, and 200 tons Corroding at \$3.65. Although some ask \$3.70, the market cannot at the close be called any better than \$3.65 for both. At St. Louis, Corroding sold at a price equal to \$3.70 laid down here. Spanish Pig Lead exportation during the first 11 months of 1884, 108,227 tons, against 116,049 in 1883, and 106,783 in 1882. Soft Spanish is unaltered in the London market, at £10. 10/. Manufacturers are quoted as follows: Lead Pipe, 5 1/4¢ @

lb; Sheet Lead, 6 1/4¢; Tin-Lined Lead Pipe, 15¢, and Block-Tin Pipe, 40¢, allowing in trade for Old Lead delivered in New York 3¢ @ lb. Shot: Drop, 6¢; Buck, 7¢; Chilled, 7¢. Shot in 5-lb bags, 1¢ @ lb extra. From London we learn this afternoon that the market is unchanged.

**Spelter and Zinc.**—A dragging state of affairs has been noticeable in the market for Common Domestic Spelter, at \$4.30 for ordinary lots, up to \$4.50 for choice brands, and at these figures the market closes dull. Silesian we quote at \$4.80, nominally. Reports from Breslau state that there is a good demand there. Spanish Calamine export, first 11 months of 1884, 27,277 tons, against 28,439 in 1883 and 24,597 in 1882. We quote Bertha Refined 8¢. Silesian has remained steady in the London market at £14. Sheet Zinc is moderately active at \$5.15 @ \$5.25 for Domestic. We are cabled from London that there is no change in the market.

**Antimony.**—Has been dull at 9 1/4¢ for Hallett, and 10 1/2¢ for Cookson. The former remains unaltered at £39 in London.

#### Metal Exchange.

The following transactions have been reported as having occurred on the floor of the New York Metal Exchange since our last:

WEDNESDAY, February 18.	
31 tons Tin, April.....	\$0.173
15 tons Tin, March.....	173
THURSDAY, February 19.	
10 tons Tin, April.....	173

#### INDUSTRIAL ITEMS.

##### NEW JERSEY.

The blast furnace at Secaucus was blown in recently.

##### PENNSYLVANIA.

The Main Belting Company, of Philadelphia, manufacturers of "Levinthan" cotton belting, have at the New Orleans Exposition a mammoth belt, 7 1/2 feet wide, 8 ply thick, which is said to be the largest belt ever exhibited. These goods are working their way into general use, for the reason that they can be made any width, length or thickness, without lap or joint to be affected by dampness, therefore can be used in all kinds of places where belting is needed. Many of these belts can be seen in use throughout the exposition, where they are doing good service. Their exhibit is in charge of Mr. M. Campbell.

The puddling department of the Stony Creek Rolling Mill, at Norristown, owned by J. H. Boone, of Reading, started up on February 17.

The Laurel Iron Works, of Carmichael & Emmons, at Coatesville, are receiving new machinery, intended for turning out heavy plates.

The Manhattan Hardware Works, Reading, are crowded with orders, and the wages of the 16 molders will be increased 5 per cent. on March 1, and a further advance of 5 per cent. on May 1.

The mills of the Phoenix Iron Company, at Phoenixville, will go into operation this week, single turn.

The Hope Mill of the Pottstown Iron Company is now being put in order with the intention of starting it again. It has been idle for a year.

About 50 molders employed by the Scranton Stove Company quit work on February 18. A few days ago about 15 men were suspended, and the manager employed an apprentice. The men remonstrated and insisted that if an additional man was employed it should be one of those suspended. The manager did not yield, and they left the works.

Nathaniel Ferguson, senior member of the firm of Ferguson, White & Co., of Robeson Furnace, one of the oldest iron-producing establishments in Pennsylvania, has sold out his interest to Wm. R. White, of Philadelphia. Mr. Ferguson has been connected with Robeson Furnaces for the past 28 years, and is well-known among iron men all over the State.

John A. Wood & Son, of Pittsburgh, have leased the Connelly coke plant on the Monongahela River, opposite Elizabeth, and will operate it.

The Charlotte Furnace Company will blow out their furnace at Scottsdale this week, to make necessary repairs to lining and hot blast.

A small cupola furnace at Harrisburg, owned by Buchanan, Fisher & Co., was destroyed by fire on February 11. The furnace was used to melt buckshot, which was run into pigs or rough castings, such as sash weights, &c. A similar furnace is being erected by the same firm at Lebanon.

No. 2 blast furnace of the E. & G. Brooke Iron Company made an output last week of 450 tons of pig iron.

##### PITTSBURGH AND VICINITY.

B. F. Rafferty & Co. have effected a compromise with their creditors by agreeing to pay one-third of their indebtedness this month, one-third next month and the balance in six months.

The Linden Steel Company, Limited, are now preparing the foundations for a new 10-inch train of rolls, to be used for general work.

Moorhead & Co., will resume operations at their Soho Mill this week, the striking employees agreeing to go back at the reduction in wages announced by the firm, which was the cause of the strike.

A meeting of the coke syndicate was held in this city on February 18. The reports from the different firms in the combination showing that the demand for coke during the past few days exceeded the production, it was unanimously decided to order the firing up of 10 per cent. more ovens at once, and that the ovens run six days a week. This will increase the production to 60 per

cent of the capacity of the works controlled by the syndicate. There was no talk of an advance in prices, but it is possible that the rates will be increased to \$1.25 about April 1.

The firm of Thompson, Epping & Carpenter, manufacturers of pumps, &c., has been dissolved by the retirement of Mr. J. D. Thompson. The business will be carried on by the remaining partners.

Furnaces A, C, D and E, of the Edgar Thomson Steel Works, at Braddock, are now in blast. Furnace B is being repaired.

The Westinghouse Machine Company, report trade as opening remarkably active in 1885. Their sales for the month of January were 67 engines, aggregating 1752 horse-power, which is certainly good for hard times. The electric-light industry still continues to furnish plenty of business. Besides a large number of engines for lighting private establishments they have contracted for one or more engines for the following public light companies: The Newton Electric Light Company, of Newton, Iowa; the Champion Electric Light Company, of Springfield, Ohio; the Excelsior Electric Light Company, Port Huron, Mich.; the Northwestern Electric Light and Power Company, Omaha, Neb.; the Weston Electric Light Company, Lexington, Ky.; and the Brush Electric Light Company, Buffalo, N. Y., who order two more engines of 65 horse-power each, making 12 Westinghouse engines in all which are running in their principal stations.

McCully & Co. will start up a new furnace at their bottle factory, on Twenty-sixth street, the latter part of this month. The addition will employ about 16 blowers and 70 boys. The brightening up of the bottle business necessitated a larger plant.

Robinson, Rea & Co., whose foundry and machine shops were destroyed by fire some time ago, expect to commence as soon as the weather will permit the erection of new shops with all modern improvements. They have occupied temporary quarters since the fire, but have not been inconvenienced to any extent in their work from this cause.

An explosion took place at the Apollo Mill of the Volta Iron Company, Limited, last week, by which the end of the engine-house was blown out and the engineer severely scalded.

The stove molders of Pittsburgh are discussing the advisability of making some move to have the rates of wages in force before the last strike restored. A committee will be appointed to confer with the manufacturers. It was reported last week that the latter had also held a meeting and decided to grant no reduction, but this is denied by the manufacturers.

##### OHIO.

It has been telegraphed throughout the country that a disagreement between the Junction Iron Company, of Mingo Junction, and their employees has led to the discharge of their puddlers and the commencement of the manufacture of steel nails. President Laughlin, after denying the statement, says: "We expect to pay the puddlers what we have agreed to, or stop only when we cannot do it, but we have often said we thought the true interests of the boilers would be advanced by a voluntary reduction on their part for puddling, thus enabling us to continue making iron nails, which we are now doing, some 1300 kegs daily, of superior quality, and selling the same without having a guarantee required that the heads won't fly off. And there are many of our customers who will only have iron, which we will continue making if we have proper reductions in our labor departments, placing us on an equality with labor in the East and with those manufacturers in this locality who have substituted machinery in the place of manual labor. I ask the correction of the statement made regarding ourselves and employees, which is utterly without foundation, and has given rise to considerable comment in our community and mills."

Negotiations are going forward in Springfield looking to the establishment there of extensive machine works formerly at Fulton, N. Y. A five-story brick building will be leased, and the concern will probably be ready to start in May next with a force of between 50 and 100 operatives.

Aultman, Miller & Co., manufacturers of "Buckeye" mowers and reapers, are now turning out 114 complete machines per day. The total number of machines for this year will be about 18,000, which is about the regular yearly product.

There was a short strike at the blast furnaces of the Cleveland Rolling Mill Company the past week against a 10 per cent. reduction, but the men, 225 in number, afterward went to work at the lower figures.

The new plow works at Canton will be 126 x 118 feet in dimensions, and will be known as the Seery Plow Works.

Four of the eight new nail machines ordered by the Kelly Nail and Iron Company, of Ironton, are in place and making nails. The remaining four are nearly completed.

Mr. James Cartwright, of Youngstown, being compelled, owing to other engagements, to decline taking the management of the Westlake Rolling Mill, at Warren, for the employees who contemplate operating it on the co-operative plan, Mr. W. I. Metcalf, of Mineral Ridge, has been asked and has consented to do so. The work now before the committee is the raising of the \$12,000 necessary to start the mill.

The works of Brown, Bonnell & Co., Youngstown, were in operation in all departments on February 19 for the first time in two years.

##### ILLINOIS.

The Ogden Engine Company intend to place a few more lathes in their machinery department. The company have recently put into position a special lathe of their own design for boring engine castings.

The Chicago Safe and Lock Company are getting out their castings for safes. They are also putting out an order for 400 tons of iron to be used in the manufacture of safes,

and are about ready to place an order for a quantity of steel. Machinery for these works are being rapidly put in place and additional purchases are being made. Some \$20,000 to \$30,000 worth of machinery will be put in to start with. A specialty will be made of safe-deposit vault work, in which it is proposed to introduce some new improvements.

The Union Foundry and Pullman Car Wheel Works, at Pullman, are engaged on ironwork, consisting of floor beams and columns, for the Texas State House, and for the Rome Building at St. Louis interior columns, wrought-iron floor construction, iron stairways and sidewalk lights. They are also doing a large amount of other structural iron work.

The Challenge Lock and Model Company, of Chicago, in addition to the type-setting device referred to last week, are perfecting a new type-writer, especially adapted for making a large number of copies at once, and will also turn out a line of new tools for difficult work in model-making.

The New Barton Pump Company, of New Barton, have been incorporated to manufacture an improved hand-power lifting and force pump, the invention of O. Patterson, of New Barton, one of the stockholders. The company hold the right to manufacture and sell the pump in nine States.

E. Plumb, of Streator, is meeting with an active demand for his ditching machines. He recently placed an order for 10 Westinghouse machines to be used in driving the ditching machines, making 22 which he has purchased for that purpose during the past year.

##### INDIANA.

Dean Bros.' Steam Pump Works, Indianapolis, have orders for new pumping machinery consisting of six duplex steam pumps for the new blast furnace at Dayton, Tenn. This furnace is being built by a company of Englishmen.

The cause of the boiler explosion at the works of the Central Iron and Steel Company, Brazil, is still unknown. It has been ascertained that the engineer, who has been blamed for carelessness, tried the water and found plenty not five minutes before the explosion. The boiler was new, having been in use but one month, and was made of first-class iron. The matter will be thoroughly investigated. In all, eight men came to their death by the explosion.

It is reported that the Oliver Chilled Plow Works are contemplating moving from South Bend to Laporte on account of their recent labor troubles at the former place.

##### MISSOURI.

Buck's Stove and Range Company, of St. Louis, started work in their foundry two weeks ago, and are now in full operation.

The St. Louis Stamping Company have been running their Granite Iron Rolling Mills full-handed since February 1. The output of the mill for 1884 was 4368 net tons of sheet iron and steel.

The Laclede Rolling Mills, the Harrison Wire Works, the Vulcan Steel Works and the St. Louis Glass Works are apparently among the permanently idle establishments of St. Louis.

##### COLORADO.

The report that the Bessemer Works of the Colorado Coal and Iron Company, at South Pueblo, are soon to start up in all departments is pronounced a mistake by the company.

##### VIRGINIA.

The output of Low Moor Furnace for the 277 days of 1884 for which it was in blast was about 31,741 tons of 2300 pounds, or an average of about 114.6 tons a day. The largest output in one day was 141.5 tons, December 26, 1884. The consumption of ore was about 73,000 tons, of coke 46,000 and of limestone 34,000.

The new Princess Furnace, on the line of the Richmond and Allegheny Railroad, has stopped for a couple of weeks for repairs. The product of this furnace is 30 to 40 tons a day of iron phenomenal for its toughness.

##### WEST VIRGINIA.

Statements made in certain press dispatches to the effect that the Benwood Iron Works have decided to erect a steel plant are pronounced unauthorized by the company.

The boilers at Wheeling who have recently lost their situations through the substitution of steel for iron by certain of the nail mills there are endeavoring to compel the nailers to demand 20 per cent. more wages for cutting steel nails, by way of retaliation, but without success so far.

##### ALABAMA.

It is reported that the Birmingham Rolling Mill Company, of Birmingham, contemplate refitting their mills with a view to making steel instead of iron.

Sloss Furnaces are both running successfully, making 160 tons of foundry and forge iron a day. The company are shipping largely to Eastern points.

Messrs. Aiken & Lighton, manufacturers of foundry molding machinery, Birmingham, have occupied their new works. The foundry is 50 x 85 feet, with truss roof, and is completely filled with foundry molding machines. The finishing shop is 30 x 50 feet, with two-story front, the upper story being used as the pattern shop.

##### TENNESSEE.

Warren Charcoal Furnace is soon to blow out for repairs. Her product for some time has run from 40 to 50 tons a day.

South Pittsburgh and Sewanee furnaces have for a month averaged more than two-thirds of their output, foundry grades.

##### KENTUCKY.

Messrs. B. F. Avery & Sons, manufacturers of plows, &c., are running to their full capacity, which is 2000 plows per day, and say they are behind their orders. The season began late, but they are making up for lost time.

The Louisville Agricultural Works are running full, and claim to have a good supply of orders.





**L. COES'**  
Genuine and Mechanics,  
**PATENT**  
**Screw Wrenches**  
MANUFACTURED BY  
**L. COES & CO.,**  
Worcester, Mass.  
ESTABLISHED IN 1839.



Our Genuine Wrenches are made with straight bars, full width and enlarged jaw, having ribs cast inside, which strengthen the jaw and give a full bearing on front of bar. These improvements, in combination with our new ferrule, made with double bearings, an iron tube, fitted to the shank and resting against the lower bearings, rigidly held in position by the handle and nut, effectually preventing back thrust of ferrule (see sectional view), verify our claim that we manufacture the heaviest and strongest Wrench in the market. None genuine unless stamped.

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Worcester, Mass.  
Warehouse,  
97 Chambers and 81 Reade Sts.  
NEW YORK.  
**DURRIE & McCARTY,**  
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PITTSBURGH, PA.,  
**BUILDERS' FINE HARDWARE,**  
RIM AND MORTISE DOOR LOCKS WITH  
**BURGLAR-PROOF ATTACHMENT.**  
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Mathes' Patent Burglar-Proof Sash Locks.  
**PADLOCKS.**  
TEA, COUNTER, UNION AND PLATFORM SCALES.  
Catalogues and Lists furnished on application.  
**JOHN H. GRAHAM & CO., Agents, 113 Chambers St., New York.**

**ILLINOIS IRON & BOLT CO.,**  
Nos. 20 to 26 Main Street,  
CARPENTERSVILLE, KANE CO., ILL.

BLACKSMITHS' TOOLS, JACK SCREWS,



**CARRIAGE MAKERS' VISES,**  
THIMBLE SKEINS, SADIrons,  
COPYING PRESSES AND STANDS, &c.

**QUAKER CITY LAWN MOWER.**  
Guaranteed Superior to any other Center Cut MOWER ON THE MARKET.



Has no Equal, Surpassing all others, and pronounced "THE BEST."

New Price Lists will be ready about February 10th. Please write for same to

**THE QUAKER CITY Reduced in Price.**  
Now, why buy a worthless mower?  
**SEND FOR LIST.**  
**Lloyd & Supplee Hdw. Co.,**  
Philadelphia.  
**DURRIE & McCARTY New York.**

**1885.**  
**PENNSYLVANIA**  
**LAWN MOWER.**

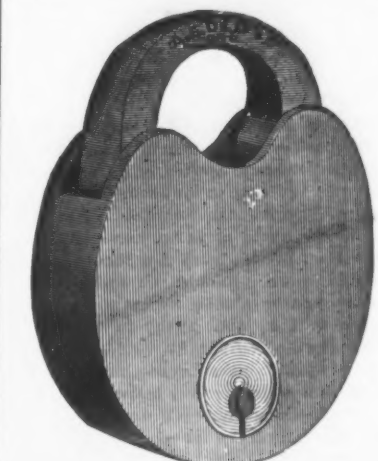


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**PRATT & CO., Buffalo, N. Y.**  
**SIMMONS HARDWARE CO., St. Louis, Mo.**  
**HAMILTON & MATHEWS, Rochester, N. Y.**  
**MARKLEY, ALLING & CO., Chicago, Ill.**  
**R. A. CULTER & CO., Peoria, Ill.**  
**BUHL, SONS & CO., Detroit, Mich.**  
**LAYMAN, CAREY & CO., Indianapolis, Ind.**  
**LOCKWOOD, TAYLOR & CO., Cleveland, Ohio.**  
**WM. FRANKFURTH & CO., Milwaukee, Wis.**  
**WALTER S. LUDLOW, Cincinnati, Ohio.**  
**THE TODD-DONIGAN IRON CO., Louisville, Ky.**  
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## A. E. DEITZ. BARBER'S BIT BRACES.



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**CAST BRASS HARDWARE**  
FOR  
**ICE HOUSES AND REFRIGERATORS**  
Manufactured and kept in stock by

**W. & J. TIEBOUT,**  
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BRASS, GALVANIZED & SHIP CHANDLERY  
**HARDWARE,**  
Nos. 16 & 18 Chambers St.,  
NEW YORK.



ALWAYS GIVES THE  
UTMOST SATISFACTION.

**Main Belting Co.,**  
Manufacturers of  
THE LEVIATHAN  
COTTON  
BELTING.

Unsurpassed for  
Strength, Durability and  
Cheapness.  
Made to any Length,  
Width and Strength.  
**Main Driving Belts.**  
Guaranteed to Run  
Straight, Even Through-  
out.  
No Cross Joints, Un-  
affected by Damp.  
Clings well to the Pulley.  
Has no equal. In fact,  
is THE BELT.

**MAIN BELTING  
COMPANY,**  
S. W. cor. Ninth and Reed  
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We are now filling orders for all grades of  
Braces.

While our standard goods cannot be sold at  
much reduction from former prices, the new grades  
will be offered at market rates for goods of like quality. Our Braces  
are still covered by six good and valid patents, which have several  
years to run. Quotations on our full line will be furnished on request.

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**CHAMPLAIN**  
Forged Horse Nails.  
MANUFACTURED BY THE  
**NATIONAL HORSE NAIL CO.,**  
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HOT FORGED AND COLD HAMMERED POINTED. MADE OF BEST  
NORWAY IRON AND WARRANTED.  
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**THE SEIDEL & HASTINGS CO.,**  
WILMINGTON, DELAWARE,  
New York Office, No. 90 John St.; Entrance on Gold St.,  
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## BEST CHARCOAL BOILER PLATES, AND PLATE IRON GENERALLY.

ALSO BEST QUALITY HOMOGENEOUS STEEL PLATES.

We ask the special attention of the trade to our C. H. No. 1 Boiler Plates, which we  
manufacture expressly for the Shells of Steam Boilers and stamp 50,000 pounds T. B. when  
desired. One hundred and sixteen tests of this iron, made during the last three years by the  
U. S. Inspectors of Steam Vessels, show an average tensile strength of 58,808  
pounds to the sectional square inch, and an average reduction of area of the fractured  
section of 30% per centum. Our prices are as low as the production of a good article will admit of.

**VARIETY IRON WORKS.**



**ALFRED C. REX & CO.,**  
Manufacturers of  
**PATENTED HARDWARE SPECIALTIES AND NOVELTIES.**  
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BRANCH OFFICES:  
126 Chambers St., New York, Chas. E. Spier, Mgr.  
and 415 Commerce St., Phila.  
New Spring Specialties—King Egg Beaters, awarded medal at American Institute, New  
York; King Candle Lamp and Lantern, cheapest combination ever made.

**DAY BROS.'**  
**PORTABLE FORGES,**  
Fan Blowers, Tire Sanders, etc.  
All sizes. The most improved and handiest.  
Blacksmiths' Machines of all sorts.  
Send for full particulars.  
419 & 421 N. 2d St., PHILADELPHIA, PA.




## PURE TURKISH EMERY. WALPOLE EMERY MILLS

South Walpole, Mass.



(Continued from page 18.)

tons of ingots being made from pig carrying from .09 to .14 of phosphorus. The metal possessed an ever-constant welding property, with great toughness. My attention having been called to the process by Mr. James P. Witherow, who had witnessed its working in England, and had, with Mr. Henry W. Oliver, Jr., secured the control of the patents in this country, Mr. Oliver kindly gave me every facility to investigate what they were doing, as well as putting the works at my disposal to try any experiments I might desire. Being anxious to determine to what extent the use of high-phosphorus iron was possible, I first had a mixture tried which gave a metal with about .34 per cent. of that element. To my surprise this worked so well that I ventured further and doubled my proportion of high-phosphorus pig, obtaining a steel with .54 per cent. of phosphorus, and my surprise certainly did not decrease when I saw the test piece bend double cold and the metal work beautifully when hot. Thinking these results might be instances of those accidents which sometimes defy explanation, I had the experiments repeated, with like results, and since then many tons of this high-phosphorus metal have been made and used for various purposes. Some of the ingots were rolled into slabs and sent to the works of the Albany and Rensselaer Iron and Steel Company, at Troy, where they were rolled into nail plate and cut into nails at the factory of that company. These samples which I have before me are some of them, and I think no one can question their quality being all that could be desired. In fact, they possess a stiffness which is valuable, while their ability to stand torture speaks for itself.

This partially-finished shovel was also made from Clapp-Griffiths metal. As you see, the strap has been jumped on and a perfect weld made. The lower end was quenched in water and turned over cold without producing more of a flaw than you see. Mr. J. M. Sherred, chemist of the Albany and Rensselaer Iron and Steel Company finds it contains

Carbon.....	.11
Silicon.....	.014
Sulphur.....	.028
Phosphorus.....	.54
Manganese.....	.58

This shovel is not an isolated case, but hundreds of them have been made from the same grade of metal. These other samples are also from the phosphorus metal, while these button-head bolts, bent double in the thread, are from metal made from ordinary Bessemer pig. Several physical tests have been made from these phosphorus steels, some from pieces rolled from the sprues or gates made in bottom casting, and others from specimens rolled from perfect ingots. From the latter, which are the only fair tests, the results have been:

	Tensile Strength. Pounds.	Elastic Limit. Pounds.	Elongation. Per cent.	Reduction of area. Per cent.
Oct. 27, '84.	74,790	55,070	25.35	48.8
Nov. 11, '84.	80,080	55,060	23.0	36.9
Nov. 11, '84.	80,270	56,290	22.75	30.6
Nov. 11, '84.	80,430	56,290	17.5	14.3
Nov. 11, '84.	78,720	56,410	14.25	15.3
Feb. 4, '85.	80,940	58,570	24.00	35.4
	79,870	58,570	23.25	36.4
	80,670	60,240	23.00	32.5
	79,700	59,550	23.25	37.6

In all cases 1/2-inch round test pieces were used, 8 inches long.

The steel tested on February 4 had the following composition:

Carbon.....	.08
Silicon.....	.01
Phosphorus.....	.50
Manganese.....	.48
Sulphur.....	.09

How far and with what certainty the use of high-phosphorus iron can be carried remains to be determined. The works of Messrs. Oliver Bros. & Phillips have been so pressed with orders that I did not feel at liberty to further interfere with their running. The demand for Clapp-Griffiths metal increased to such an extent that it became evident they must be altered to permit of a greater output. This is about completed, and when they resume I have no doubt the experiments will be continued. While at this time not entering into the discussion of the effect of silicon in metals, one very striking peculiarity of the steel made in the Clapp-Griffiths converter claims our attention. In all the determinations of silicon in this metal which I have seen, and they have been many, there have been but four showing over .02 per cent. of that element, and they were from spoils heats, while 50 per cent. of the analyses have given but .01, and in 12 per cent. of them the silicon has been too low for estimation.

The nails shown had but .009 silicon, and the shovel but .014 per cent. Does not this low silicon permit of the high phosphorus? The loss in the process is much higher than in the ordinary Bessemer converter. No doubt this comes from the column of iron being so shallow over the tuyeres. It is a marked peculiarity of the blows that red smoke from burning iron appears at the very commencement, but clears away toward the middle of the heat. The cinder soon rises and runs off at the tap-hole. Presently this flow of cinder entirely ceases. Now, is it not furnishes that the early oxidation of iron furnishes a base which carries off the silicon of the bath? And does not this, with the low blast pressure, account for the constant small percentages of silicon in the metal? There must be a reason for it. The percentages of silicon in the pig used vary largely; but something constantly eliminates it. Low silicon steel is and can be made in the ordinary Bessemer converter, but I have never made steel having silicon so low as .01 per cent., and we well know that it is not a constant characteristic. I do not speak of the higher carbon steels, for in their manufacture considerable silicon is introduced with the recarburizer. I am fully convinced that the Clapp Griffiths converter possesses great value for this country. While believing that it cannot make rails or ship plates in competition with the regular Bessemer plants, it can compete with them in small products, even if it does not make an article which they cannot produce. And most certainly the open-hearth is out of the race, so far as cost of product is concerned.

Professor Turner has lately taken position against both the Avesta and Clapp-Griffiths

or any other small converter, so far as their value relates to making low-carbon steels. He admits that they may be of use to certain Alpine districts of Austria, but for producing soft metals he favors either the basic or Siemens-Martin processes. It is with great hesitation that I venture to differ from so eminent an authority. My excuse must be that I speak for America, he for Continental Europe.

To place a basic plant on an equality with an acid one, in the matter of costs, it seems to be well established that the basic iron must be quite \$3 per ton cheaper than the pig for the acid process. Then the plant is a very expensive one—much more so than the regular Bessemer. You must build both a steel works and a brickyard. In Continental Europe, where labor is so illy paid and the phosphorus ores so much cheaper than the purer ores, the status is no doubt quite different. This is leaving out of consideration any use of high-phosphorus irons in the Clapp-Griffiths. But if further experience proves that, for many purposes we can take either a mixture of 50 per cent. Bessemer at \$17, and 50 per cent. mill iron with 1 per cent. of phosphorus at \$15, making pig cost \$16, or take cheap irons, which can be made in so many sections with from .30 per cent. to .50 per cent. phosphorus, we ought to produce, as previously shown, a metal for \$21.95 per ton of ingots, and these ingots of a size and shape to be rolled into many finished products. As intimated before, the demand for low steels is constantly increasing. Take steel nails for instance. If they have not already replaced iron ones in the market, they are rapidly doing so, and all the resolutions of lodges of the Amalgamated Association will not stop the irresistible march of events. To supply this demand, in my judgment, the modest Clapp-Griffiths converter offers peculiar advantages.

A most interesting discussion followed the reading of these papers, particular stress being laid upon the results obtained with high-phosphorus pig iron, and the opportunity afforded by the success of this process to rolling mills and blast furnaces to enter into the manufacture of steel at a minimum of expenditure and abandonment or destruction of but little existing plant. The discussion was participated in by Messrs. Kent, Maynard, Ward and Firmstone. Following these papers was an equally interesting one by William P. Blake, New Haven, Conn., on THE TIN-ORE VEINS IN THE BLACK HILLS OF DAKOTA.

The discovery of tin ore in the Black Hills of Dakota dates from June, 1883, and short preliminary notices were published in September of that year. The discovery point is known as the Etta Mine, in the central portion of the Hills, about 6 miles east of Harney Peak, and 20 from Rapid City. The Etta was located for mica. It is a granitic mass, rising in the midst of fine-grained micaceous and arenaceous slates, which form the Coos group of the White Mountain formations of New Hampshire. Some portions of these slates are highly garnetiferous, other portions contain staurolite, and in some places there is a large development of sandstones of regular stratification, in thick beds, which form prominent ridges. These sandstones are compact and solid, and possess a bluish-gray color, due to protoxide of iron. They are in the condition of quartzites, and they indicate shallow seas on the borders of some continental or extensive shores in that remote period of the world's history.

There is a singular absence of limestone strata and of magnesian rocks in these old formations. Hornblende slates and syenitic rocks are also rare. Granite in the form of bosses and (nearer to the Harney Peak range) in long dikes is common. But at the Etta and in its vicinity the granitic masses are columnar, rather than tabular, in form. The Etta outcrop is nearly circular, in horizontal section, measuring about 200 feet in its longest diameter, and 100 to 150 feet in its transverse diameter across the outcrop. The line of demarcation between this granite mass and the slates is sharp and distinct; and where the contact is opened to view by the lower tunnel, there is a clay selvage making a distinct wall, as in regular veins. This mass, like most of the similarly-formed granitic masses of the region, is characterized by extremely coarse, massive crystallization of the constituent minerals. Slabs of pure feldspar from 12 to 20 inches in length may be frequently seen, and masses of white quartz several feet thick and nearly pure are abundant.

The outcrop and the whole columnar mass have a rudely concentric structure, the outer portions, next to the country rock, being characterized by a band or belt of dark-colored mica, alternating in places with muscovite in large plates. This is succeeded by massive quartz, with irregular bunches of massive albite and of orthoclase feldspar, together with enormous crystals of spodumene and irregular bunches of a dense aggregation of small crystals of mica and albite, forming a kind of greisen-rock, an albitic greisen, in which cassiterite is abundantly disseminated in small grains and partly-formed crystals.

The mineralization is remarkably even. The masses of greisen are rarely without the black grains of cassiterite sprinkled through the mass. The percentage of black tin is not yet ascertained by working in a mill in the large way, but average samples show that it is about 2 1/2 per cent. Hand samples of selected rock will yield as high as 6 per cent. The result originally obtained by sampling the outcrops was 3 per cent. A sample lot of 2 tons of greisen-rock ore sent to New York, and there worked, yielded between 3 and 4 per cent. of concentrate—black tin of high grade—some of which, smelted by Mr. Rottet, at the New York Metallurgical Works, gave a number of 25-pound bars of excellent tin. These percentages are, of course, independent of the massive cassiterite, of which some hundredweights have been found outside the greisen-rock. This occurrence is exceptional, but more may at any time be brought to light by the excavations. The percentage of black tin in the ore compares favorably with that found in the ore of other tin regions. The general average percentage of black tin of six large mines upon the great flat lode of Redruth, Cornwall, in 1876, was 2 1/2%, and less than this has been worked with profit in some places.

The mineralogical association of the tin ores at the Etta and other places in the Black Hills appears to be very similar to that observed in other tin regions. As a general rule, mica is the most common associate. This is the mineral with which the cassiterite is most directly and closely connected. Albite may be mentioned as next in intimate relationship, while in some of the veins—notably in the Hill City district—quartz is the pervading gangue of veinstone. At the Etta, also, spodumene rich in lithia is a close associate, and occasionally cassiterite is found in the midst of the massive crystals. This association of spodumene with tinstone is common in several of the granitic masses in Maine, and was brought to my attention by Mrs. Ellen Richards, of the Massachusetts Institute of Technology.

There are now three well-defined districts of tin-bearing lodes in the Dakota portion of the Black Hills: 1. On the east side of the Harney range, at the Etta, Ingersoll, Monarch, Peerless and other claims. 2. Near the summit at Bismarck's rancho, where cassiterite occurs in several narrow veins of quartz. 3. At Hill City, on the western side of the Harney range, where there are both granitic veins and quartz veins bearing tin ore. To these we may add mention of a tin district in the Wyoming portion of the Black Hills, about 20 miles west of Deadwood, where a considerable amount of stream tin has been washed out of the bed of Sand creek, and the discovery of the ore in place in granitic veins is reported. In the Hill City district the cassiterite is generally in crystalline bunches or masses in the midst of quartz, together with a bordering mass of mica in close, compact crystals, frequently forming sheets of mica crystals in the midst of the quartz, parallel with the walls. It is rare that any other minerals are found in these veins. In the granitic veins the grains of cassiterite are smaller, blacker and more crystalline than in the quartz veins.

Succeeding the paper of Professor Blake, Mr. E. N. Rottet, of New York City, made a statement regarding the results obtained in working the ore of the Etta Mine. From Mr. Rottet's statement it appeared that the greisen in which the cassiterite is disseminated in small grains and partly-formed crystals, and which, though not as rich in tin as some streaks found at the mine, is nevertheless the chief source of the tin, yields on the average about 3 per cent. of white tin. The rich streak above referred to, and which at the opening of the mine was the ore sought by the miners, the greisen with the cassiterite being blasted in enormous quantities and regarded as valueless, contained sometimes as high as 40 per cent. of tin. The ore is easy to concentrate either dry or wet, the specific gravity of the associated minerals readily permitting their separation from the tin ore. Some pigs of tin from this mine, among the first ever commercially produced in this country, were exhibited, and small pieces of what Mr. Rottet assured the members were from the first tin produced, were distributed to the audience as souvenirs. Some samples of gold found in the mine, though not intimately associated with the tin, was here shown by Mr. Bailey. It was stated that in some portions of the work the gold paid the entire expense of mining. Quite an amount of the greisen in mass and somewhat broken, and specimens of the rich streak, as well as the various products of concentrating the ore, were shown.

On Thursday morning the party took a train for

THE TILLY FOSTER IRON MINE, located near Brewster's, Putnam County, N. Y., about 50 miles from the city. Reaching the mine near noon, the members gathered in the office of the company, where Mr. Charles Macdonald gave a general outline of the character of the deposit and of the system of mining recently adopted, illustrating his remarks with the aid of a model. The majority of the ladies and gentlemen then went underground, being lowered in the skip in groups of three and four, under the direct care of Capt. Andrew Cosgriff, the superintendent.

The Tilly Foster Mine is the most prominent of a group of mines in Putnam County, which, so far as their geology is concerned, is identical with the magnetite deposits of New Jersey and Lake Champlain. The form of the Tilly Foster ore body is that of half a lens, distorted, however, in this case by a fault which cuts across the ore body, throwing it nearly 100 feet, and consequently, making its aggregate thickness very large at some points, while branches of ore run into the hanging and foot wall country. At the surface the length of the ore body on the strike, which is northeast, is about 375 feet, expanding on lower levels to about 500 feet, the greatest thickness being about 160 feet. The ore has been removed to a depth of over 160 feet by an open pit, the underground workings being conducted from the Cheever and Cosgriff shafts, both of them steep slopes, fitted for hoisting. The ore body contracts in depth, and at the 500-foot level has so far developed this tendency that the early pinching out of the ore is looked forward to. The ore itself and the hanging country is shattered by slips which have rendered the mining of so large a mass an operation requiring great caution. The system followed has been to sink the shafts on the foot wall, open levels every 100 feet, drifting along the foot wall and opening out from this drift, at distances of about 20 feet or more, rooms about 24 feet wide. Thus there are on the 300-foot level five south rooms, four north rooms and one south hanging room, while on the 500 foot level there are three south, two north and two north hanging rooms. The rooms are carried upward for 80 feet, leaving a floor under the level above of 20 feet. Only that quantity of ore broken down is taken out which is necessary to give the miners space while the room is being raised. The rest remains in the room until the excavation has reached the upper floor. It is only then that the accumulated ore is taken away. No sorting is done underground. It will be understood, therefore, that more than one-half of the ore body is left standing in the mine in the form of huge pillars and floors. With the prospect of a final exhaustion of the body before them, the owners of the mines, after a careful study of the conditions affecting the

mine, decided upon carrying out a plan which would allow them to rob these pillars safely from below upward. It is estimated that fully 1,000,000 tons of ore can be made available. The system alluded to is to fill the rooms already excavated with masonry laid in cement resting upon arches having their bearings in deep cuts in the hanging and foot walls. By thus transferring the weight to these masonry pillars it becomes possible to remove the pillars of ore left standing. It is estimated that the cost of the masonry work per ton of ore made available for mining will be about 50 cents. It is probable, however, that the greater facility of mining ore from pillar over that of blasting it out of the solid will reduce this extra cost to about 30 or 35 cents. Being, as it is, the first piece of work of this kind carried out in this country, its progress will be followed with close interest by mining engineers.

The ore of the Tilly Foster Mine is a magnetite, running as shipped between 46 and 48 per cent. of iron, to which percentage it is sorted up above ground, gangs of men going over the cars ready for shipment. The waste is stated to be about 25 per cent. The chief peculiarity of the Tilly Foster ore, which gives it increased value, is that its chief gangue are magnesia minerals, rendering it nearly self-fluxing. The principal gangue is the rare mineral chondrodite, an analysis of which, quoted from a paper by Professor Dana, is given in Mr. F. A. Wendt's paper, read before the Philadelphia meeting of the American Institute of Mining Engineers, as follows:

Analysis of Chondrodite.	
	Per cent.
Silica.....	34.10
Magnesia.....	53.17
Ferrous oxide.....	7.17
Alumina.....	0.48
Fluorine.....	4.14
Total.....	99.06

This mineral is so fusible that it melts in the candle. Mr. Wendt quotes also the following destructive analysis of an average sample of Tilly Foster ore, made by Mr. O. D. Allen, of the Sheffield Scientific School:

	Per cent.
Sesquioxide of iron.....	48.34
Protoxide of iron.....	22.67
Protoxide of manganese.....	0.17
Magnesia.....	13.20
Silica.....	12.67

	Per cent.
Total.....	96.95
Metallic iron.....	56.64
Phosphorus.....	0.019
Sulphur.....	0.050

Average samples of shipments to the Bethlehem Iron Company gave:

	I.	II.
Iron.....	46.76	47.43
Silica.....	10.22	12.69
Phosphorus.....	0.028	0.37

Average of 30 commercial samples, from sale of the ore, yielded 47.8 per cent. metallic iron.

The Tilly Foster Mine is equipped with Rand drills and adequate hoisting and pumping plant. The mine has shipped as much as 60,000 tons of ore in one year. Its highest shipment recently was about 84 tons in one day.

After returning from their underground trip the members were handsomely entertained at luncheon, and at 3 o'clock again took the train for this city.

## WASHINGTON NEWS.

WASHINGTON, D. C., February 24, 1885.

## INVESTIGATION OF THE NEW YORK CUSTOM HOUSE.

Secretary McCulloch states that only one branch of the investigation of the New York Custom House had been completed, and consequently he could not make public at present any of the work of the commission. They would continue investigating charges of undervaluations and other evasions of the law, and it was probable that a complete report would not be ready for several weeks. Two special agents at New York had been notified that their services could be dispensed with, but he did not care to divulge their names. There were more special agents in New York than were needed, and it was likely that others would be discontinued shortly. The fact that these men had been dropped did not necessarily imply that they were concerned in any questionable transactions, although this impression had gone out. Heretofore the investigation at New York had been principally confined to the duties of special agents, but the pending investigation would go into every branch of work in the Custom House. It was afterward found that the agents removed were Brackett and Chalker.

## OUR TRADE RELATIONS.

A letter has been written by Secretary Frelinghuysen to Senator Miller, of California, chairman of the Senate Committee on Foreign Relations, and by the latter laid before the Senate, embodying statistics showing our trade relations with the several countries of the continent, British North America excepted. The letter was suggested by a resolution introduced and supported in a speech by Senator Morrill last December. The Secretary says: "Waiving the Constitutional questions involved in the negotiation of reciprocity treaties, and confining this communication to their commercial aspects and results, a survey of the field would seem to show that any increase of our trade with foreign countries commensurate with our industrial development and requirements, especially in the matter of finding markets for our manufactures, can only come through our commercial relations with countries inferior to us in population and wealth. Such countries, in fact, afford the only field for the development of natural resources and the consumption of foreign manufactures." He argues at length in favor of reciprocity treaties with Mexico and Central and South American countries.

## THE POST OFFICE APPROPRIATION BILL.

The Post-Office Appropriation bill has been placed in a very critical position by the action of the Senate in replacing the appropriation to pay for carrying the mails in American ships under contracts for four years at a rate not to exceed 50 cents per mile traveled. It will be remembered that this provision was in the bill as originally reported by the House Appropriations Committee, but was stricken out by the House.

The provision is commonly called the Pacific-Mail subsidy because the Pacific Mail Company are now running the only American steamers to foreign ports, except those plying between the United States and Cuba and Mexico, for whose benefit the House passed the clause in the bill putting the mail service with these countries upon the same footing as the domestic steamboat service. The House has drawn the line at 200 miles distance from a United States port. Within that distance any price may be paid for carrying the mail which the Postmaster-General and the owners of American steamships may agree upon. This, in the opinion of the House, is a legitimate mail contract. When it is proposed to contract with American steamships for carrying the mail a longer distance to foreign countries lying beyond the 200-mile limit, the House considers such a contract a subsidy, and opposes the proposition with great determination.

## CLASSIFICATION OF COACH AND HARNESS FURNITURE.

The department having received a letter from the chairman of the Board of General Appraisers in regard to the classification of harness under the tariff of March 3, 1883, the Secretary has replied: "Paragraph 415 of Schedule N provides for 'coach and harness furniture of all kinds, saddlery, coach and harness hardware,' at a duty of 35 per cent. ad valorem. It is held by the department that this phrase includes saddlery, and that the paragraph also includes 'harness' as commonly imported."

## NO DRAWBACKS ON TIN DISKS.

The Secretary of the Treasury has issued an order which took effect on the 15th., announcing that a drawback will not be allowed on tin disks resulting from the manufacture of tin cans out of imported material.

## TREASURY CIRCULAR RELATING TO DRAWBACKS.

The Secretary of the Treasury, in explanation of the circular of January 5, relating to drawbacks, which prescribes the indispensable evidence of manufacture to be produced, says that collectors are not precluded thereby from requiring additional evidence in cases where there is special reason to doubt the competency of the parties making the manufacturer's affidavit, or where the articles covered by an export entry are not clearly shown to be those described in the manufacturer's affidavit filed with the entry, or therein referred to. The manufacturer's affidavit must be filed at the port where the entries referring thereto are made; and the practice of accepting abstracts from affidavits filed with entries at other ports is to be discontinued.

## AMERICAN AGRICULTURAL MACHINERY ABROAD.

The State Department has issued a volume of consular reports upon the subject of introducing American agricultural machinery into foreign countries. It appears from most of these reports that to obtain a market for American agricultural implements in most parts of Europe is almost an impossibility. The agriculturists are slow to change and intensely prejudiced in favor of the old ways. Some progress has been made in Germany, but Consul Keifer, at Stettin, and Consul-General Brewer, at Berlin, both agree that American machinery which is approved by the popular taste is at once imitated and made so much cheaper by German mechanics that no American manufacturer can compete. Mr. Brewer says that as Germany is now exporting agricultural machinery to Russia, Africa and South America, the proper place to compete with German manufacturers is in those countries instead of within their own Empire. All the consuls in Mexico agree that in that country no other country can compete with the United States in this line of manufactures. Not much encouragement is given in these reports of immediate success in introducing American agricultural machinery and implements in either Africa or South America until the United States possesses regular means of direct communication with those countries in vessels owned by our own citizens.

## DUTY ON LITHOGRAPHERS' NEEDLES.

The collector at New York having assessed duty on an importation of certain so-called "needles," returned by the appraiser as manufactures of steel and wood, under Paragraph 216, T. I., new, and the importers having appealed from his assessment, the department, in affirming the collector's decision, says: "It appears from the appraiser's report and an inspection of the sample submitted that the articles in question are engravers' tools with wooden handles, used in tracing patterns on lithographic stones, and are composed of wood and steel, the latter being the component of chief value. They are not the 'needles' provided for in Paragraph 216, T. I., new, under which the appellants claim they should be classified, and the general clause in said paragraph cannot be construed to include in its meaning merchandise so entirely foreign in its use and construction to the articles specifically enumerated in the remainder of said paragraph."

## BRASS BODKINS.

In the appeal from an assessment of duty at 45 per cent. ad valorem on an importation of certain "bodkins or tape needles," and claimed by the appellants to be dutiable at 25 per cent. ad valorem, as needles not otherwise provided for, or as gilt articles at 35 per cent., the department says: "The appraiser reports that the articles in question are the same in character as those subject of decision in Synopsis 4703, and that they are not plated or gilt articles, but a manufacture of brass. An inspection of the samples confirms this view, and the department accordingly affirms your decision."

## METAL STAMPS WASHED WITH NICKEL.

The Secretary of the Treasury, in affirming an assessment of duty at the rate of 45 per cent. ad valorem on an importation of certain metal stamps which the appellants claimed to be dutiable as plated articles or wares at 35 per cent. ad valorem, says: "It appears that the stamps in question are manufactured of brass and steel, and that certain portions are thinly washed with nickel. They do not come within the meaning of Paragraph 210, T. I., new, as plated articles or wares, and were properly classified as manufactures of metal, under T. I., new, 216."



## Current Hardware Prices, February 25, 1885.

## HARDWARE.

[illegible]



Parallel, Fronties.....	Adjustable.....	dis 25.85
Parallel, Simpson.....	doz \$11.00, dis 33.50	dis 10
Saw Filers, Bonney's, New, & S.....	doz \$15.00, dis 33.50	dis 10
Saw Filers, Hearn's.....	doz \$17.50, dis 10	dis 10
Saw Filers, Reading.....	doz \$19.00, dis 40.810	dis 10
Saw Filers, Wentworth.....	doz \$20.10, dis 30.810	dis 10
Crowell Hand Vice.....	doz \$20.10, dis 30.810	dis 10
Richardson's Vice and Anvil.....	doz \$20.10, dis 30.810	dis 10
<b>Washer Cutters.</b>		
Smith's Patent.....	doz \$12.00, dis 30.810	dis 10
Johnson's.....	doz \$11.00, dis 33.50	dis 10
Penny's.....	doz \$11.00, dis 33.50	dis 10
Appleton's.....	doz \$11.00, dis 33.50	dis 10
Bonney's.....	doz \$11.00, dis 33.50	dis 10
<b>Washers.—See Nuts and Washers.</b>		
<b>Well Wheels—8 in., \$1.85; 10 in., \$2.15; 12 in., \$3</b>		
<b>Wire</b>		
Brass and Copper, new list, Jan. 18, 1884.....	dis 25.50	dis 10
Market, Bright and Annealed, Nos. 0 to 18.....	dis 7.05	dis 10
Market, Coppered.....	dis 6.55	dis 10
Market, Galvanized.....	dis 6.05	dis 10
Market, Tinned, Tinned list.....	dis 6.05	dis 10
Stone, Bright and Annealed Nos. 19 to 30.....	dis 7.05	dis 10
Stone, Bright and Annealed Nos. 27 to 30.....	dis 7.05	dis 10
Stone, Galvanized, Nos. 19 to 30.....	dis 6.05	dis 10
Stone, Tinned, Tinned list.....	dis 6.05	dis 10
Tinned Broom Wire.....	dis 6.05	dis 10
Cast Steel Wire.....	dis 5.85	dis 10
Wire on Spool, Tinned list, Nos. 8 & 6.....	dis 7.05	dis 10
Annealed Grape, Nos. 10 to 14.....	dis 7.05	dis 10
Fence Staples.....	dis 5.85	dis 10
Wire on Spool, Galvanized.....	dis 7.05	dis 10
Scrub's Steel Wire.....	dis 5.85	dis 10
Barb Fence.....	dis 5.85	dis 10
Steel Music Wire, Nos. 7 to 30.....	dis 10	dis 10
Picture Wire.....	dis 10	dis 10
Wire Cloth, green, drab and black, per 100 sq. ft.....	\$2.00 net @ dis 5 @ 10	dis 10
<b>Wrenches.—American Adjustable.</b>		
Baxter's Adjustable "B".....	dis 45	dis 10
Baxter's Diagonal.....	dis 33.50	dis 10
Coe's Genuine.....	dis 33.50	dis 10
Coe's Mechanics.....	dis 60.810	dis 10
Coe's Pattern, Malleable.....	dis 75.815	dis 10
Coe's Pattern, Wrought.....	dis 75.815	dis 10
Grand Standard.....	dis 65.810	dis 10
Grand Agricultural.....	dis 75.815	dis 10
Bemis & Call's Patent Combination.....	dis 30	dis 10
Bemis & Call's Merriek's Pattern.....	dis 25	dis 10
Bemis & Call's Bridge's Pattern.....	dis 25	dis 10
Bemis & Call's Cylinder or Gas Pipe.....	dis 35.85	dis 10
Bemis & Call's No. 3 Pipe.....	dis 50.810	dis 10
The Favorite Pocket (Bright).....	dis 8.00, dis 50.810	dis 10
Webster's Patent Combination.....	dis 25.810	dis 10
Bonham's.....	dis 25.810	dis 10
Always Ready.....	dis 25.810	dis 10
Aligator.....	dis 40.810	dis 10
Bonhues's Engineer.....	dis 25	dis 10
<b>Wringers.</b>		
Novelty, for Common Tubs, No. 2, 10 inch.....	Per doz, \$20.00	dis 10
Novelty, for Common Tubs, No. 3, 14 inch.....	Per doz, \$4.50	dis 10
Excelsior, for Stationary Tubs, No. E, 10 inch 30.00		dis 10
Excelsior, for Stationary Tubs, No. F, 11 inch 43.50		dis 10
Excelsior, with Folding Bench, No. A, 10 inch 48.00		dis 10
Excelsior, with Folding Bench, No. B, 11 inch 52.50		dis 10
Universal, No. 24.....	30.00	dis 10
Universal, No. 3.....	33.00	dis 10
Universal, No. 14.....	34.50	dis 10
Universal, No. 14.....	39.00	dis 10
Universal, for Set Tubs, A 24.....	57.00	dis 10
Universal, for Set Tubs, E 14.....	58.00	dis 10
Adams & Co. No. 8.....	60.00	dis 10
Peerless No. 24.....	30.00	dis 10
Peerless No. 34.....	30.00	dis 10
No. 90 Improved 24.....	34.50	dis 10
"Metropolitan," No. 2.....	33.00	dis 10
"Metropolitan," No. 24.....	33.00	dis 10
<b>Wrought Staples, Hooks, &amp;c.—See Hooks.</b>		



# WHOLESALE METAL PRICES, February 25, 1885.

## METALS.

**IRON.**—Duty: Bars, 8-10¢ to 11-10¢ per lb.; provided that no Bar Iron shall pay a less rate of duty than 35¢. Sheet, 11-0¢ to 15-10¢ per lb. Band, Hoop and Scroll, 1¢ to 1-4-10¢ per lb. Railroad Bars weighing more than 25 lb per yard, 7-10¢ of 1¢ per lb.

**Standard American Pig Iron.**  
 Foundry No. 1 X..... 18.00 @ 19.00  
 Foundry No. 2 X..... 17.00 @ 18.00  
 Gray Forge..... 16.00 @ 17.00

**No. 1 Scotch Pig Iron.**  
 Carnbroe..... 19.50 @ 20.50  
 Coltness..... 21.50 @ 22.00  
 Glengarnock..... 21.50 @ 22.00  
 Gartsherrie..... 21.00 @ 21.50  
 Langloan..... 21.50 @ 22.00  
 Summerlee..... 19.00 @ 19.25  
 Dalzellington..... 18.50 @ 19.00  
 Eglinton..... 19.00 @ 19.25  
 Clyde..... 19.00 @ 19.25

**WIRE.**  
 Steel at Eastern mills..... 17.00 @ 17.50  
 Old Rails, Ts..... 16.50 @ 17.00

**Bar Iron from Store.**

Common Iron:  
 1/2 to 1 in. round and square..... 1.6 @ 1.9¢  
 1 to 6 in. x 1/2 to 1 in...... 1.9 @ 2.3¢  
 1 to 6 in. x 3/4 to 1 in...... 2.1 @ 2.4¢  
 Rods—1/2 and 1-1/2 round and sq..... 2.0 @ 2.3¢  
 Bands—1 to 6-1/2 round and sq..... 2.3 @ 2.5¢  
 "Burden's Best" Iron, base price..... 2.3¢  
 "Burden's" H. B. & S. Iron, base price..... 2.6¢  
 Norway Nail Rods..... 2.6¢

**Sheet Iron from Store.**

Common American Cleaned.  
 Nos. 10 to 16..... 2.70 @ 3.00  
 17 to 20..... 3.00 @ 3.30  
 21 to 24..... 3.30 @ 3.60  
 25 and 26..... 3.60 @ 3.90  
 27..... 3.90 @ 4.20  
 28..... 4.20 @ 4.50  
 Galvanized, 10 to 20..... 5.00 @ 5.50  
 Galvanized, 21 to 24..... 5.50 @ 6.00  
 Galvanized, 25 to 28..... 6.00 @ 6.50  
 Galvanized, 29..... 6.50 @ 7.00  
 American Russia..... 10.00 @ 11.00  
 American Cold Rolled B. B..... 5.00 @ 5.50

**Iron Wire. See Wire.**

**STEEL.**—Duty: Ingots, Bars, Sheets, &c., valued at 4¢ per lb. or less, 45¢ ad. val.; valued above 4¢ and not above 7¢ per lb., 2¢ ad. val.; valued above 7¢ and not above 10¢ per lb., 3¢ ad. val.; valued above 10¢ per lb., 3 1/2¢ ad. val. Extra: Steel Bars, Rods, &c., cold hammered or peeled, in any way in addition to ordinary hot rolling, 1 1/2¢ in addition to above; Steel Circular Saw Plates, 1¢ in addition to the above.

**American Cast Steel.**

For American Steel, see Pittsburgh quotations.

**English Steel.**

Best Cast..... 15.00 @ 16.00  
 Extra Cast..... 16.00 @ 17.00  
 Circular Saw Plates..... 17.00 @ 18.00  
 Round Machinery Cast..... 18.00 @ 19.00  
 Swaged Cast..... 19.00 @ 20.00  
 Best Double Shear..... 20.00 @ 21.00  
 Billet, 1st quality..... 21.00 @ 22.00  
 German Steel, Best..... 22.00 @ 23.00  
 2d quality..... 23.00 @ 24.00  
 3d quality..... 24.00 @ 25.00  
 Sheet Cast Steel, 1st quality..... 25.00 @ 26.00  
 2d quality..... 26.00 @ 27.00  
 3d quality..... 27.00 @ 28.00

**TIN.**—Duty: Plates, Sheets, Tagger and Tonne, 1¢ per lb.; Bars, Block and Pigs free.

Banca..... 10.00 @ 11.00  
 Straits..... 11.00 @ 12.00  
 English..... 12.00 @ 13.00  
 Bar..... 13.00 @ 14.00

**Charcoal Tin Plates.**

1 C 10x14..... 25 sheets..... 5.00 @ 5.50  
 1 C 12x12..... 25 sheets..... 5.50 @ 6.00  
 1 C 14x20..... 10 sheets..... 6.00 @ 6.50  
 1 C 16x24..... 10 sheets..... 6.50 @ 7.00  
 1 C 18x28..... 10 sheets..... 7.00 @ 7.50  
 1 C 20x32..... 10 sheets..... 7.50 @ 8.00  
 1 C 22x36..... 10 sheets..... 8.00 @ 8.50  
 1 C 24x40..... 10 sheets..... 8.50 @ 9.00  
 1 C 26x44..... 10 sheets..... 9.00 @ 9.50  
 1 C 28x48..... 10 sheets..... 9.50 @ 10.00  
 1 C 30x52..... 10 sheets..... 10.00 @ 10.50  
 1 C 32x56..... 10 sheets..... 10.50 @ 11.00  
 1 C 34x60..... 10 sheets..... 11.00 @ 11.50  
 1 C 36x64..... 10 sheets..... 11.50 @ 12.00  
 1 C 38x68..... 10 sheets..... 12.00 @ 12.50  
 1 C 40x72..... 10 sheets..... 12.50 @ 13.00  
 1 C 42x76..... 10 sheets..... 13.00 @ 13.50  
 1 C 44x80..... 10 sheets..... 13.50 @ 14.00  
 1 C 46x84..... 10 sheets..... 14.00 @ 14.50  
 1 C 48x88..... 10 sheets..... 14.50 @ 15.00  
 1 C 50x92..... 10 sheets..... 15.00 @ 15.50  
 1 C 52x96..... 10 sheets..... 15.50 @ 16.00  
 1 C 54x100..... 10 sheets..... 16.00 @ 16.50  
 1 C 56x104..... 10 sheets..... 16.50 @ 17.00  
 1 C 58x108..... 10 sheets..... 17.00 @ 17.50  
 1 C 60x112..... 10 sheets..... 17.50 @ 18.00  
 1 C 62x116..... 10 sheets..... 18.00 @ 18.50  
 1 C 64x120..... 10 sheets..... 18.50 @ 19.00  
 1 C 66x124..... 10 sheets..... 19.00 @ 19.50  
 1 C 68x128..... 10 sheets..... 19.50 @ 20.00  
 1 C 70x132..... 10 sheets..... 20.00 @ 20.50  
 1 C 72x136..... 10 sheets..... 20.50 @ 21.00  
 1 C 74x140..... 10 sheets..... 21.00 @ 21.50  
 1 C 76x144..... 10 sheets..... 21.50 @ 22.00  
 1 C 78x148..... 10 sheets..... 22.00 @ 22.50  
 1 C 80x152..... 10 sheets..... 22.50 @ 23.00  
 1 C 82x156..... 10 sheets..... 23.00 @ 23.50  
 1 C 84x160..... 10 sheets..... 23.50 @ 24.00  
 1 C 86x164..... 10 sheets..... 24.00 @ 24.50  
 1 C 88x168..... 10 sheets..... 24.50 @ 25.00  
 1 C 90x172..... 10 sheets..... 25.00 @ 25.50  
 1 C 92x176..... 10 sheets..... 25.50 @ 26.00  
 1 C 94x180..... 10 sheets..... 26.00 @ 26.50  
 1 C 96x184..... 10 sheets..... 26.50 @ 27.00  
 1 C 98x188..... 10 sheets..... 27.00 @ 27.50  
 1 C 100x192..... 10 sheets..... 27.50 @ 28.00  
 1 C 102x196..... 10 sheets..... 28.00 @ 28.50  
 1 C 104x200..... 10 sheets..... 28.50 @ 29.00  
 1 C 106x204..... 10 sheets..... 29.00 @ 29.50  
 1 C 108x208..... 10 sheets..... 29.50 @ 30.00  
 1 C 110x212..... 10 sheets..... 30.00 @ 30.50  
 1 C 112x216..... 10 sheets..... 30.50 @ 31.00  
 1 C 114x220..... 10 sheets..... 31.00 @ 31.50  
 1 C 116x224..... 10 sheets..... 31.50 @ 32.00  
 1 C 118x228..... 10 sheets..... 32.00 @ 32.50  
 1 C 120x232..... 10 sheets..... 32.50 @ 33.00  
 1 C 122x236..... 10 sheets..... 33.00 @ 33.50  
 1 C 124x240..... 10 sheets..... 33.50 @ 34.00  
 1 C 126x244..... 10 sheets..... 34.00 @ 34.50  
 1 C 128x248..... 10 sheets..... 34.50 @ 35.00  
 1 C 130x252..... 10 sheets..... 35.00 @ 35.50  
 1 C 132x256..... 10 sheets..... 35.50 @ 36.00  
 1 C 134x260..... 10 sheets..... 36.00 @ 36.50  
 1 C 136x264..... 10 sheets..... 36.50 @ 37.00  
 1 C 138x268..... 10 sheets..... 37.00 @ 37.50  
 1 C 140x272..... 10 sheets..... 37.50 @ 38.00  
 1 C 142x276..... 10 sheets..... 38.00 @ 38.50  
 1 C 144x280..... 10 sheets..... 38.50 @ 39.00  
 1 C 146x284..... 10 sheets..... 39.00 @ 39.50  
 1 C 148x288..... 10 sheets..... 39.50 @ 40.00  
 1 C 150x292..... 10 sheets..... 40.00 @ 40.50  
 1 C 152x296..... 10 sheets..... 40.50 @ 41.00  
 1 C 154x300..... 10 sheets..... 41.00 @ 41.50  
 1 C 156x304..... 10 sheets..... 41.50 @ 42.00  
 1 C 158x308..... 10 sheets..... 42.00 @ 42.50  
 1 C 160x312..... 10 sheets..... 42.50 @ 43.00  
 1 C 162x316..... 10 sheets..... 43.00 @ 43.50  
 1 C 164x320..... 10 sheets..... 43.50 @ 44.00  
 1 C 166x324..... 10 sheets..... 44.00 @ 44.50  
 1 C 168x328..... 10 sheets..... 44.50 @ 45.00  
 1 C 170x332..... 10 sheets..... 45.00 @ 45.50  
 1 C 172x336..... 10 sheets..... 45.50 @ 46.00  
 1 C 174x340..... 10 sheets..... 46.00 @ 46.50  
 1 C 176x344..... 10 sheets..... 46.50 @ 47.00  
 1 C 178x348..... 10 sheets..... 47.00 @ 47.50  
 1 C 180x352..... 10 sheets..... 47.50 @ 48.00  
 1 C 182x356..... 10 sheets..... 48.00 @ 48.50  
 1 C 184x360..... 10 sheets..... 48.50 @ 49.00  
 1 C 186x364..... 10 sheets..... 49.00 @ 49.50  
 1 C 188x368..... 10 sheets..... 49.50 @ 50.00  
 1 C 190x372..... 10 sheets..... 50.00 @ 50.50  
 1 C 192x376..... 10 sheets..... 50.50 @ 51.00  
 1 C 194x380..... 10 sheets..... 51.00 @ 51.50  
 1 C 196x384..... 10 sheets..... 51.50 @ 52.00  
 1 C 198x388..... 10 sheets..... 52.00 @ 52.50  
 1 C 200x392..... 10 sheets..... 52.50 @ 53.00  
 1 C 202x396..... 10 sheets..... 53.00 @ 53.50  
 1 C 204x400..... 10 sheets..... 53.50 @ 54.00  
 1 C 206x404..... 10 sheets..... 54.00 @ 54.50  
 1 C 208x408..... 10 sheets..... 54.50 @ 55.00  
 1 C 210x412..... 10 sheets..... 55.00 @ 55.50  
 1 C 212x416..... 10 sheets..... 55.50 @ 56.00  
 1 C 214x420..... 10 sheets..... 56.00 @ 56.50  
 1 C 216x424..... 10 sheets..... 56.50 @ 57.00  
 1 C 218x428..... 10 sheets..... 57.00 @ 57.50  
 1 C 220x432..... 10 sheets..... 57.50 @ 58.00  
 1 C 222x436..... 10 sheets..... 58.00 @ 58.50  
 1 C 224x440..... 10 sheets..... 58.50 @ 59.00  
 1 C 226x444..... 10 sheets..... 59.00 @ 59.50  
 1 C 228x448..... 10 sheets..... 59.50 @ 60.00  
 1 C 230x452..... 10 sheets..... 60.00 @ 60.50  
 1 C 232x456..... 10 sheets..... 60.50 @ 61.00  
 1 C 234x460..... 10 sheets..... 61.00 @ 61.50  
 1 C 236x464..... 10 sheets..... 61.50 @ 62.00  
 1 C 238x468..... 10 sheets..... 62.00 @ 62.50  
 1 C 240x472..... 10 sheets..... 62.50 @ 63.00  
 1 C 242x476..... 10 sheets..... 63.00 @ 63.50  
 1 C 244x480..... 10 sheets..... 63.50 @ 64.00  
 1 C 246x484..... 10 sheets..... 64.00 @ 64.50  
 1 C 248x488..... 10 sheets..... 64.50 @ 65.00  
 1 C 250x492..... 10 sheets..... 65.00 @ 65.50  
 1 C 252x496..... 10 sheets..... 65.50 @ 66.00  
 1 C 254x500..... 10 sheets..... 66.00 @ 66.50  
 1 C 256x504..... 10 sheets..... 66.50 @ 67.00  
 1 C 258x508..... 10 sheets..... 67.00 @ 67.50  
 1 C 260x512..... 10 sheets..... 67.50 @ 68.00  
 1 C 262x516..... 10 sheets..... 68.00 @ 68.50  
 1 C 264x520..... 10 sheets..... 68.50 @ 69.00  
 1 C 266x524..... 10 sheets..... 69.00 @ 69.50  
 1 C 268x528..... 10 sheets..... 69.50 @ 70.00  
 1 C 270x532..... 10 sheets..... 70.00 @ 70.50  
 1 C 272x536..... 10 sheets..... 70.50 @ 71.00  
 1 C 274x540..... 10 sheets..... 71.00 @ 71.50  
 1 C 276x544..... 10 sheets..... 71.50 @ 72.00  
 1 C 278x548..... 10 sheets..... 72.00 @ 72.50  
 1 C 280x552..... 10 sheets..... 72.50 @ 73.00  
 1 C 282x556..... 10 sheets..... 73.00 @ 73.50  
 1 C 284x560..... 10 sheets..... 73.50 @ 74.00  
 1 C 286x564..... 10 sheets..... 74.00 @ 74.50  
 1 C 288x568..... 10 sheets..... 74.50 @ 75.00  
 1 C 290x572..... 10 sheets..... 75.00 @ 75.50  
 1 C 292x576..... 10 sheets..... 75.50 @ 76.00  
 1 C 294x580..... 10 sheets..... 76.00 @ 76.50  
 1 C 296x584..... 10 sheets..... 76.50 @ 77.00  
 1 C 298x588..... 10 sheets..... 77.00 @ 77.50  
 1 C 300x592..... 10 sheets..... 77.50 @ 78.00  
 1 C 302x596..... 10 sheets..... 78.00 @ 78.50  
 1 C 304x600..... 10 sheets..... 78.50 @ 79.00  
 1 C 306x604..... 10 sheets..... 79.00 @ 79.50  
 1 C 308x608..... 10 sheets..... 79.50 @ 80.00  
 1 C 310x612..... 10 sheets..... 80.00 @ 80.50  
 1 C 312x616..... 10 sheets..... 80.50 @ 81.00  
 1 C 314x620..... 10 sheets..... 81.00 @ 81.50  
 1 C 316x624..... 10 sheets..... 81.50 @ 82.00  
 1 C 318x628..... 10 sheets..... 82.00 @ 82.50  
 1 C 320x632..... 10 sheets..... 82.50 @ 83.00  
 1 C 322x636..... 10 sheets..... 83.00 @ 83.50  
 1 C 324x640..... 10 sheets..... 83.50 @ 84.00  
 1 C 326x644..... 10 sheets..... 84.00 @ 84.50  
 1 C 328x648..... 10 sheets..... 84.50 @ 85.00  
 1 C 330x652..... 10 sheets..... 85.00 @ 85.50  
 1 C 332x656..... 10 sheets..... 85.50 @ 86.00  
 1 C 334x660..... 10 sheets..... 86.00 @ 86.50  
 1 C 336x664..... 10 sheets..... 86.50 @ 87.00  
 1 C 338x668..... 10 sheets..... 87.00 @ 87.50  
 1 C 340x672..... 10 sheets..... 87.50 @ 88.00  
 1 C 342x676..... 10 sheets..... 88.00 @ 88.50  
 1 C 344x680..... 10 sheets..... 88.50 @ 89.00  
 1 C 346x684..... 10 sheets..... 89.00 @ 89.50  
 1 C 348x688..... 10 sheets..... 89.50 @ 90.00  
 1 C 350x692..... 10 sheets..... 90.00 @ 90.50  
 1 C 352x696..... 10 sheets..... 90.50 @ 91.00  
 1 C 354x700..... 10 sheets..... 91.00 @ 91.50  
 1 C 356x704..... 10 sheets..... 91.50 @ 92.00  
 1 C 358x708..... 10 sheets..... 92.00 @ 92.50  
 1 C 360x712..... 10 sheets..... 92.50 @ 93.00  
 1 C 362x716..... 10 sheets..... 93.00 @ 93.50  
 1 C 364x720..... 10 sheets..... 93.50 @ 94.00  
 1 C 366x724..... 10 sheets..... 94.00 @ 94.50  
 1 C 368x728..... 10 sheets..... 94.50 @ 95.00  
 1 C 370x732..... 10 sheets..... 95.00 @ 95.50  
 1 C 372x736..... 10 sheets..... 95.50 @ 96.00  
 1 C 374x740..... 10 sheets..... 96.00 @ 96.50  
 1 C 376x744..... 10 sheets..... 96.50 @ 97.00  
 1 C 378x748..... 10 sheets..... 97.00 @ 97.50  
 1 C 380x752..... 10 sheets..... 97.50 @ 98.00  
 1 C 382x756..... 10 sheets..... 98.00 @ 98.50  
 1 C 384x760..... 10 sheets..... 98.50 @ 99.00  
 1 C 386x764..... 10 sheets..... 99.00 @ 99.50  
 1 C 388x768..... 10 sheets..... 99.50 @ 100.00  
 1 C 390x772..... 10 sheets..... 100.00 @ 100.50  
 1 C 392x776..... 10 sheets..... 100.50 @ 101.00  
 1 C 394x780..... 10 sheets..... 101.00 @ 101.50  
 1 C 396x784..... 10 sheets..... 101.50 @ 102.00  
 1 C 398x788..... 10 sheets..... 102.00 @ 102.50  
 1 C 400x792..... 10 sheets..... 102.50 @ 103.00  
 1 C 402x796..... 10 sheets..... 103.00 @ 103.50  
 1 C 404x800..... 10 sheets..... 103.50 @ 104.00  
 1 C 406x804..... 10 sheets..... 104.00 @ 104.50  
 1 C 408x808..... 10 sheets..... 104.50 @ 105.00  
 1 C 410x812..... 10 sheets..... 105.00 @ 105.50  
 1 C 412x816..... 10 sheets..... 105.50 @ 106.00  
 1 C 414x820..... 10 sheets..... 106.00 @ 106.50  
 1 C 416x824..... 10 sheets..... 106.50 @ 107.00  
 1 C 418x828..... 10 sheets..... 107.00 @ 107.50  
 1 C 420x832..... 10 sheets..... 107.50 @ 108.00  
 1 C 422x836..... 10 sheets..... 108.00 @ 108.50  
 1 C 424x840..... 10 sheets..... 108.50 @ 109.00  
 1 C 426x844..... 10 sheets..... 109.00 @ 109.50  
 1 C 428x848..... 10 sheets..... 109.50 @ 110.00  
 1 C 430x852..... 10 sheets..... 110.00 @ 110.50  
 1 C 432x856..... 10 sheets..... 110.50 @ 111.00  
 1 C 434x860..... 10 sheets..... 111.00 @ 111.50  
 1 C 436x864..... 10 sheets..... 111.50 @ 112.00  
 1 C 438x868..... 10 sheets..... 112.00 @ 112.50  
 1 C 440x872..... 10 sheets..... 112.50 @ 113.00  
 1 C 442x876..... 10 sheets..... 113.00 @ 113.50  
 1 C 444x880..... 10 sheets..... 113.50 @ 114.00  
 1 C 446x884..... 10 sheets..... 114.00 @ 114.50  
 1 C 448x888..... 10 sheets..... 114.50 @ 115.00  
 1 C 450x892..... 10 sheets..... 115.00 @ 115.50  
 1 C 452x896..... 10 sheets..... 115.50 @ 116.00  
 1 C 454x900..... 10 sheets..... 116.00 @ 116.50  
 1 C 456x904..... 10 sheets..... 116.50 @ 117.00  
 1 C 458x908..... 10 sheets..... 117.00 @ 117.50  
 1 C 460x912..... 10 sheets..... 117.50 @ 118.00  
 1 C 462x916..... 10 sheets..... 118.00 @ 118.50  
 1 C 464x920..... 10 sheets..... 118.50 @ 119.00  
 1 C 466x924..... 10 sheets..... 119.00 @ 119.50  
 1 C 468x928..... 10 sheets..... 119.50 @ 120.00  
 1 C 470x932..... 10 sheets..... 120.00 @ 120.50  
 1 C 472x936..... 10 sheets..... 120.50 @ 121.00  
 1 C 474x940..... 10 sheets..... 121.00 @ 121.50  
 1 C 476x944..... 10 sheets..... 121.50 @ 122.00  
 1 C 478x948..... 10 sheets..... 122.00 @ 122.50  
 1 C 480x952..... 10 sheets..... 122.50 @ 123.00  
 1 C 482x956..... 10 sheets..... 123.00 @ 123.50  
 1 C 484x960..... 10 sheets..... 123.50 @ 124.00  
 1 C 486x964..... 10 sheets..... 124.00 @ 124.50  
 1 C 488x968..... 10 sheets..... 124.50 @ 125.00  
 1 C 490x972..... 10 sheets..... 125.00 @ 125.50  
 1 C 492x976..... 10 sheets..... 125.50 @ 126.00  
 1 C 494x980..... 10 sheets..... 126.00 @ 126.50  
 1 C 496x984..... 10 sheets..... 126.50 @ 127.00  
 1 C 498x988..... 10 sheets..... 127.00 @ 127.50  
 1 C 500x992..... 10 sheets..... 127.50 @ 128.00  
 1 C 502x996..... 10 sheets..... 128.00 @ 128.50  
 1 C 504x1000..... 10 sheets..... 128.50 @ 129.00  
 1 C 506x1004..... 10 sheets..... 129.00 @ 129.50  
 1 C 508x1008..... 10 sheets..... 129.50 @ 130.00  
 1 C 510x1012..... 10 sheets..... 130.00 @ 130.50  
 1 C 512x1016..... 10 sheets..... 130.50 @ 131.00  
 1 C 514x1020..... 10 sheets..... 131.00 @ 131.50  
 1 C 516x1024..... 10 sheets..... 131.50 @ 132.00  
 1 C 518x1028..... 10 sheets..... 132.00 @ 132.50  
 1 C 520x1032..... 10 sheets..... 132.50 @ 133.00  
 1 C 522x1036..... 10 sheets..... 133.00 @ 133.50  
 1 C 524x1040..... 10 sheets..... 133.50 @ 134.00  
 1 C 526x1044..... 10 sheets..... 134.00 @ 134.50  
 1 C 528x1048..... 10 sheets..... 134.50 @ 135.00  
 1 C 530x1052..... 10 sheets..... 135.00 @ 135.50  
 1 C 532x1056..... 10 sheets..... 135.50 @ 136.00  
 1 C 534x1060..... 10 sheets..... 136.00 @ 136.50  
 1 C 536x1064..... 10 sheets..... 136.50 @ 137.00  
 1 C 538x1068..... 10 sheets..... 137.00 @ 137.50  
 1 C 540x1072..... 10 sheets..... 137.50 @ 138.00  
 1 C 542x1076..... 10 sheets..... 138.00 @ 138.50  
 1 C 544x1080..... 10 sheets..... 138.50 @ 139.00  
 1 C 546x1084..... 10 sheets..... 139.00 @ 139.50  
 1 C 548x1088..... 10 sheets..... 139.50 @ 140.00  
 1 C 550x1092..... 10 sheets..... 140.00 @ 140.50  
 1 C 552x1096..... 10 sheets..... 140.50 @ 141.00  
 1 C 554x1100..... 10 sheets..... 141.00 @ 141.50  
 1 C 556x1104..... 10 sheets..... 141.50 @ 142.00  
 1 C 558x1108..... 10 sheets..... 142.00 @ 142.50  
 1 C 560x1112..... 10 sheets..... 142.50 @ 143.00  
 1 C 562x1116..... 10 sheets..... 143.00 @ 143.50  
 1 C 564x1120..... 10 sheets..... 143.50 @ 144.00  
 1 C 566x1124..... 10 sheets..... 144.00 @ 144.50  
 1 C 568x1128..... 10 sheets..... 144.50 @ 145.00  
 1 C 570x1132..... 10 sheets..... 145.00 @ 145.50  
 1 C 572x1136..... 10 sheets..... 145.50 @ 146.00  
 1 C 574x1140..... 10 sheets..... 146.00 @ 146.50  
 1 C 576x1144..... 10 sheets..... 146.50 @ 147.00  
 1 C 578x1148..... 10 sheets..... 147.00 @ 147.50  
 1 C 580x1152..... 10 sheets..... 147.50 @ 148.00  
 1 C 582x1156..... 10 sheets..... 148.00 @ 148.50  
 1 C 584x1160..... 10 sheets..... 148.50 @ 149.00  
 1 C 586x1164..... 10 sheets..... 149.00 @ 149.50



## THE WEEK.

The fact that the announcement of the death of Sidney Gilchrist Thomas, in Paris, on February 1st, could be made in a meeting of the American Institute of Mining Engineers on the 20th of February and be startling news to a majority of those who heard it, may well excite surprise. If some unimportant scion of nobility should break his arm, or some titled snob lose a Jersey favorite cow, the fact would be cabled around the world; but we are left to learn by mail of the death of a brilliant young genius, who, in a short, but eventful, life, has stamped his name indelibly upon the pages which record the industrial history of the nineteenth century. That no correspondent should have recognized in the death of Mr. Thomas an event of international interest would seem to show that it attracted less attention in England than it should, and none at all in Paris. Some explanation of this may perhaps be found in the fact that the British people are now profoundly disturbed by the distressing complications in Africa, but it is inconceivable that the death of a man who has done so much for science, and whose work consummated that for which Sir Henry Bessemer has been so highly honored, should receive so little notice at the hands of the news-gatherers.

According to a statement made by Gen. Charles Roome, president of the Municipal Gas Company, of New York, that company paid the following dividends on \$4,000,000 stock: In 1875, 35 per cent.; in 1876, 15 per cent.; in 1877, 20 per cent.; in 1878, 15 per cent.; in 1879, 10 per cent.; in 1880, 18 per cent.; in 1881, 22 per cent.; and in 1882, 1883 and 1884, 25 per cent. In closing their affairs to go into the consolidation the company paid their stockholders 10 per cent.

It is said that with one exception the cotton mills of the Eastern States did business during the last six months of 1884 at a loss, and the exception was where the manufacturers stood well in the export markets.

An immense dam to divert the overflow of the Chagres River in the rainy season is one of the features in the Panama Canal. It is proposed to construct a dam on embankment of earth much resembling an immense railroad embankment, but having a more gradual slope to the sides. The length will be about a mile and the height over 200 feet. Beneath the dam a large culvert or tunnel 50 feet wide will be constructed of solid masonry, which will be sufficiently large to admit the ordinary flow of the river. The inner end of the tunnel will be fitted with strong iron doors, by which the flow of the river from the upper valley can be entirely stopped. At the upper edge of the dam, on the right bank of the river, where it rests against the hill, a channel will be cut, through which the overflow of the dam (in case it ever becomes full) will be carried around the base of the hill to join the channel cut for the diversion of the Lower Chagres on the eastern side of the canal.

Now that iron is fast displacing wood in shipbuilding, the inquiry is frequently heard in the South, Why should not Savannah and Pensacola become great shipbuilding points? Being near to the great iron regions of Alabama, and close to cheap coal and cheap timber, those ports seem to possess every needed advantage.

The English Government has conceded to the colony of Newfoundland the privilege of negotiating directly with the Government of the United States for the renewal of the fishery clauses in the Treaty of Washington, independently of any action or negotiation by the Government of Canada.

A Panama correspondent, speaking of the baneful influence of the climate upon workmen and laborers engaged on the canal, says the skilled artisans from Europe or America are the greatest sufferers. Taking a pride in their work, notwithstanding the advice of their employers they attempt to accomplish as much as they would in a temperate climate, and almost invariably become ill. These drawbacks increase the expense of manual labor. Jamaicans receive from \$1 to \$1.50 per day, which is equivalent to paying a laborer in America between \$3 and \$4 per day.

Wm. C. Kingsley died in Brooklyn on Saturday, 22d, in the 53d year of his age. He was closely connected with the East River Bridge both in its construction and management.

Superintendent McCall's report on fire and marine insurance, made to the New York State Legislature, shows that at the close of the year 1884 the fire, fire marine and marine insurance companies doing business in this State were possessed of \$202,550,110 of admitted assets, a loss of \$2,027,914, as compared with the sum reported the preceding year. The liabilities of those companies excepting scrip and capital, amounted to \$78,070,323, which is \$3,534,837 greater than was then returned. The income of the year was \$101,607,011, and the expenditures \$95,872,656, an increase of \$2,470,555 in income and \$4,704,713 in expenditures, as compared with the previous year. The whole number of companies which reported last year was 171, being four less than reported in 1883.

A committee of the Brooklyn Bridge Trustees has prepared a bill abolishing the present board and vesting the control of the structure in the mayors and comptrollers of the two cities. Wm. J. Osborne was elected to the trusteeship lately filled by Wm. C. Kingsley, deceased.

The cable traction system for street cars in Chicago failed under the recent severe stress of weather.

American capital has been largely invested in British coal mines in Vancouver Island.

The most recent link in the long chain of telegraph lines which is spreading with such rapidity over China is the land line from Shanghai to Canton. A line from Peking to

Tien-Tsin was opened a few months ago, and the capital of China was connected directly with London. Now the telegraph stretches in an unbroken line from Peking in the north to the most southern boundary of the Chinese Empire, and a message either from London or Peking might reach the headquarters of the Chinese forces on the Tonquin frontier in a few hours. Four years ago the only telegraph line in China was one about 6 miles in length, stretching from Shanghai to the sea, and erected to inform the mercantile community of the arrival of vessels off the mouth of the river.

By an explosion of natural gas in Wellsburg, Va., on the 21st inst., seven persons were killed and dwelling-house property destroyed to the value of \$50,000.

Articles incorporating the East River Bridge Company have been filed at Albany. The proposed capital is \$2,000,000, and the tunnel is to be between Ravenswood, L. I., and New York, the terminus in this city to be near First avenue, between Thirty-fourth and Eighty-sixth streets. The tunnel would be 3510 feet long and would pass through trap rock. The estimated cost is \$1,500,000, about one-fifth the estimated cost of the Blackwell's Island bridge.

The estimated losses by fire in this city last year amount to \$3,500,000. More fires resulted from illuminating than from heating.

Mr. Edison has filed a certificate of incorporation for the manufacture of electrical contrivances designed to communicate intelligence between railway trains in motion or between moving trains and stations.

Theo. Masac, a gentleman formerly attached to Jay Gould's office, in this city, has been appointed secretary to President Diaz, of Mexico.

Supt. J. E. Hilgard, of the United States Coast Survey, in reply to the complaints of navigators, informs the New York Pilot Commissioners that there is no deviation in the compass off the southern coast of Long Island, due to the presence of magnetic sands.

A wealthy Cuban shipowner proposes to establish a line of Spanish steamers to ply weekly between Havana and New York.

The new cars of the elevated railroads, in this city, are fitted with a new style of heater, which, it is said, will obviate to a large degree the overheating of the cars. The device consists of a long boiler-iron tube 4 inches in diameter, which runs along under the seats. In this tube is a smaller one that is wholly disconnected and partly filled with salt water. Steam from the locomotive boiler is let into the outside tube, and, it is said, heats up the car in a few minutes. Then the steam is shut off, and the salt-water tube gives out the heat which it has acquired gradually, keeping the car warm for three hours without additional steam from the boiler. A tin shield is placed above the tubes, so that the seats are not heated by the direct radiation from the heaters, as at present. The inventor of this system says that the old cars are being fitted with this device at the rate of two a day, and that all the cars would therefore be comfortably heated in the winter of 1885-86.

The New York elevated railroad companies no longer seek to evade assessment in New York City, and, as their total valuation is computed at \$11,527,354, this yields the city a revenue of about \$300,000 per annum.

The Dominion Government reports 103,824 new settlers in the year 1884, including 9278 from the United States, in regard to which latter item we are told that some little curiosity is excited as to how many of the enumerated laborers are Chinamen.

According to the Mexican *Financier*, the exports of precious metals from Mexico in 1884 were valued at \$33,473,283; other articles, \$13,252,213. Total, \$46,725,496, of which \$21,824,400 went to the United States, and \$19,330,152 to Great Britain.

The great expectations formed last year respecting the direct export trade from St. Louis are not realized. Compared with the previous year there is a heavy decline. The rate on grain per bushel from St. Louis to Liverpool, via river to New Orleans, was as low as 11 cents in October and June, and reached its highest in August—20½ cents. To Liverpool via New York, by rail, was 14½ cents in May and 29½ cents in December.

Messrs. Crawshaw & Sons have reduced the wages of their iron-ore miners in the Forest of Dean to about 16½ a week, or, at the rate of 24.4 cents to the shilling, \$3.80 a week. The problem of life which this rate of wages must present to the miners at these mines is one which we hope the wage earners in this country will never have to consider practically.

Michigan lumber merchants propose to make extensive arrangements for the shipment of timber from California and Oregon to the Eastern States. About \$3,000,000 will be invested in forest lands.

The new German import duty on wheat is about at the rate of 8 cents per bushel.

A proposed amendment to the law in New York State designating legal holidays includes Saturday, after 12 o'clock, noon. After that hour the presentation and payment of notes or checks shall cease.

The State Trade and Labor Assembly of Ohio, in session at Columbus, adopted resolutions against license laws in general, against the use of the words "trade unions" by anarchists, disclaiming any affiliation with Nihilist ideas, indorsing the action of Governor Hoadley in not sending troops to Hocking Valley during the strike, asking the General Assembly for night schools for children, protesting against the passage of the law pending in Congress modifying mechanics' lien laws, indorsing the Labor Press

Association and the Eight-Hour law, and requesting the passage of a law making mechanics' liens apply to all trades.

The camphor laurel, a native of China, has been successfully introduced in California, one tree in Sacramento having attained a height of 30 feet. Every part of the wood smells strongly of camphor, and is much favored by cabinet-makers as, besides being light and durable, it drives off all kinds of insects.

The fruit jobbers of this city are considering the advisability of establishing an incorporated exchange. At the same time two existing exchanges, the Petroleum and Mining exchanges, propose to consolidate, and a third is about to expire from inanition.

It is probable that the Canadian Pacific Railway will soon apply to the Dominion Government for more money, the loan of \$30,000,000 authorized at the last session having proved insufficient.

By the destruction by fire on Friday last of the Marvin Safe Company's factory, in this city, a loss was sustained amounting to \$230,000, of which \$100,000 is on 500 or more safes ready for the market or in process of manufacture that were stored in the building. One would suppose that fire-proof safes would be almost as safe fire risks as stone fences or duck ponds.

The Senate Local Committee has advised the purchase of Captain Ericsson's submarine torpedo boat, the *Destroyer*, for \$120,000.

The German annexation of Samoa is in apparent contravention of international law. The United States have a naval station at the island under treaty stipulations.

Canadian vessels coming into United States ports from ports in Ontario are exempt from the payment of tonnage dues as a result of enforcing Dingley's Shipping bill.

The contracts for the proposed Croton Aqueduct will amount to perhaps \$15,000,000, and the two firms who have got them are said to have formed a syndicate.

The prolonged and disastrous strike among the Hocking Valley miners has suddenly ended, and 2000 men find themselves in a pitiable condition, although in their desperate determination they showed no pity. The collapse was hastened by the reduction of wages in other mining regions, cutting off further assistance from external sources.

The National Association of Stationary Engineers has nearly 70 subordinate associations in various parts of the United States. There are about 9000 stationary engineers in this city, and it is desired to raise the standard of capacity.

In Congress, on the 19th inst., a significant debate took place touching the relative merits of wooden ships and ships of iron or steel. Mr. Keifer proposed to strike out the clause in the Naval bill appropriating \$400,000 for the completion of the wooden ship New York, now on the stocks in the Brooklyn Navy Yard, which was begun in 1865, and upon which no work has been done for 19 years. Mr. Hewitt, of New York, thought it was preposterous for the country to undertake to build or finish a wooden ship. Mr. Hutchings, of New York, said it was not the policy of the country to build wooden vessels, but this one should be finished as a temporary expedient. Similar views were expressed on either side. Finally, the vote to strike out was lost.

The total immigration during the year ending June 30, 1884—518,592 persons—was composed as follows:

	Males.	Females.
Professional occupations.....	2,184	100
Skilled occupations.....	50,905	4,156
Miscellaneous occupations.....	160,159	24,066
Without occupations.....	35,361	181,791

A. G. Lewis, boat builder, who is prepared to build light-draft steamers in sections, ready for transportation to the Nile, says that, excepting the concern at Yarrow, there is no establishment in Europe at all comparable with works in the United States engaged in this line of enterprise. Boats 182 x 62 feet and drawing 2 feet of water can be made to run from 10 to 16 miles an hour.

Captain Samuels, who commanded the famous clipper ship *Dreadnaught*, takes exception to the proposed expenditure in deepening the harbor of New York, claiming that the money could be better expended in the encouragement of American shipping.

He says: "It is just like the cool cheek of the English to ask us to give them 30 feet at mean tide, in order that they may cross our bar at any time. Do they not have to wait till the tide is near three-quarters flood before they can enter the Mersey at Liverpool? Mr. Bryce, the celebrated Clyde shipbuilder, says that the excuse for building deep ships is because their dock gates will not admit of ships of greater beam, and we are asked to deepen our harbor to suit their notions in shipbuilding. Let them deepen their bar and widen their dock gates before they ask us for a more convenient ingress to New York. It is certain the difficulty is not wholly with New York Harbor. The old pilot John McGinn, who 65 years ago brought in ships drawing 30 feet of water, says he could do so now."

California during the past year has reaped golden harvests. Of wheat alone she had 55,000,000 bushels, and of barley, corn and oats, 35,000,000 bushels; 15,000,000 gallons of wine, and of wool, 42,000,000 pounds; hops, 42,000 bales; beans, 20,000 tons; honey, 9000 tons. Had prices been up to the average of past years, California producers would have prospered wonderfully.

Mexicans are sending large orders to American and European manufacturers in anticipation of the increased tariff, which takes effect July 1.

Charleston, S. C., is about to undertake the driving of the deepest artesian well in the world. It will be driven in the main

part of the city, and, as it is expected to furnish 4,000,000 gallons of water a day, it is calculated, with two similar wells already down, to furnish a sufficient supply of water for the entire city for many years. The new well will be 2000 feet deep, will be at least 6 inches in diameter at the bottom, and is to be completed by next August.

The use of the telephone in agriculture is being tried in France. A large land owner in the Department of the Loire has established a regular circle of telephonic communication throughout the whole of his estates, using the largest trees as stations, and thus can simultaneously direct operations in all parts of his domain.

The newly-appointed building inspector for New York is ordering sweeping alterations in hotels and theaters, including fire-escapes and brick arches or iron griders, the latter to be built between the stage and auditorium.

British trade with India is suffering from the depreciation of silver. This metal being the principal medium of exchange, manufacturers are unable to realize their usual profits, and as a consequence are suffering from extreme depression.

Extensive shipments of cattle from ranches in Nebraska, Wyoming and Montana will be made to England via the Northern lakes during the coming season. The company chiefly concerned represent that they can be entered duty free.

It is reported from Albany that, instead of having self-supporting prisons, tax payers will be compelled to expend \$1,000,000 annually for their support, now that labor contracts are abolished.

The House Committee on Commerce decided to report a bill authorizing the registration of certain steamships as vessels of the United States, to be known as the "American Express Steamship Company," with a capital of \$10,000,000. They are to ply between Fresh Pond Bay, on Long Island, and Milford Haven, in Great Britain, and are to have a speed of 18 knots an hour.

Arrangements are making to concentrate the Hocking coal lands in Ohio under one management the coming spring. A single company now hold 12,000 acres.

## The First Steamer to Cross the Ocean.

One of the most curious things in the history of Transatlantic steam navigation is the claim that has been set up on the other side of the water to the construction and fitting out of the first pioneer Transatlantic steamers, or, more strictly speaking, to the proprietorship of the first vessels which crossed the ocean propelled exclusively by steam-power. These pioneers, it is claimed, were the *Sirius* and the *Great Western*, the former built for another class of voyages and afterward lost on the station between Cork and London, the latter built expressly for Atlantic navigation. They made the voyage in 1838, which, as will be seen, was 20 years too late for pioneers. If "exclusively propelled by steam-power," as is urged for them, means that no sails were set during the passage, the claim may be founded on fact, but that it is deceptive and misleading there is surely no doubt. The *Savannah*, an American steamship, was the first ever built to cross the ocean, and, if she carried auxiliary sails and set them when the wind was fair, she did no more than every steamer has done from that time up to the present, and could by no means be forced on that account to forego her claim to being the first steamship that crossed the seas. She was built in 1818 by Col. John Stevens, of New York, and the news of her master's intention to tempt the seas soon reached the English world, being heralded by the *London Times* in its issue of May 11, 1819, in the following paragraph: "Great experiment. A new steam vessel of 300 tons has been built at New York for the express purpose of carrying passengers across the Atlantic. She is to come to Liverpool direct." This was the *Savannah*, which, in May, 1819, left the port of New York, under the command of Capt. Moses Rogers, bound for St. Petersburg via Liverpool. She reached the latter port on June 20, having used steam 18 days out of the 26, and thus proved the feasibility of Transatlantic steam navigation. The log-book of the *Savannah*, in which Captain Rogers jotted down the incidents of the trip, is yet preserved by his descendants.

It is a curious collection of coarse, unbound paper pages, written in a bold and intelligible hand. On the first page is the following: "A journal of a voyage from New York toward Liverpool on board steamship *Savannah*, Moses Rogers, master." Here is the first entry in the log-book: "Sunday, March 28, 1819.—These 24 hours begin with fresh breezes at northwest. At 10 a. m. got under way for sea with the crew on board. At 1 p. m. the pilot left the ship off Sandy Hook light." The second entry reads: "Remarks on board, Monday, March 29, 1819. These 24 hours begin with fresh breezes and clear. At 4 p. m. the Highlands of Neversink bore north by west 6 leagues distant, from which I take my departure. At 10 p. m. took in top-gallant sails. At 8 a. m. tacked ship to the westward. Saw a brig and schooner steering to the westward. At 11 a. m. took in the mizzen and fore top-gallant sails. At 11 a. m. got the steam up and it came on for to blow fresh. We took the wheels in on deck in 30 minutes. At meridian to-day fresh breezes and cloudy. Latitude by observation, 39° 19'." It seems that the *Savannah* was so constructed that when there was a heavy sea running the paddle-wheels could be taken in on deck. This was done by rigging a sling from the mainyard, which, being swayed about, could be forced first over one wheel and then over the other. Now began a short season of very rough weather, during a part of which the *Savannah* was hoisted to. On the following Saturday, however, the weather being moderate, the wheels were again shipped and the vessel proceeded under steam.

"Presented to Captain Moses Rogers, of the steamship *Savannah* (being the first steam vessel that had crossed the Atlantic), by Sir Thomas Graham, Lord Lynedock, a passenger from Stockholm to St. Petersburg. September 15, 1819."

Thus it will be seen that the *Savannah*, which, by the way, was lost off the south side of Long Island, anticipated the alleged steam pioneers *Sirius* and *Great Western* by nearly 20 years.

After an uneventful voyage the coast of Ireland was sighted, and early one morning the *Savannah* approached the land. That afternoon she was boarded by the King's cutter *Kite*, Lieut. John Bowie. The log-book says little about this, but Moses Rogers's brother Stephen wrote an account of this amusing incident, which was published in the *Gazette*, of New London, Conn. He says: "She (the steamer) was seen from the telegraph station at Cape Clear, on the southern coast of Ireland, and reported as a ship on fire. The admiral, who lay in the cove of Cork, dispatched one of the King's cutters to her relief. But great was their wonder at their inability with all sail, in a fast vessel, to come up with a ship under bare poles. After several shots were fired from the cutter the engine was stopped, and the surprise of her crew at the mistake they had made, as well as their curiosity to see the singular Yankee craft, can be easily imagined. They asked permission to go on board, and were much gratified by the inspection of this novel novelty." Two days later, according to the log, they shipped the wheels and furled the sails and ran into the River Mersey, and at 6 p. m. came to anchor off Liverpool. Captain Rogers seems to have been as modest as he was daring, for, though having succeeded in an attempt to navigate the ocean with paddle-wheels, which many of the ablest mariners and scientists had declared perilous, if not impossible, he only jots down in his log-book a few dry details of his safe arrival, with never a comment.

A distinguished scientist had declared long before that it was not possible to cross the ocean by steam. Indeed, so sure was he that it could not be done that, when he heard that Captain Rogers proposed to make the attempt, he declared that he would swallow the first vessel that should safely reach the British Isles from this country. It would not, therefore, have seemed immodest had Captain Rogers, upon the arrival of the *Savannah*, have called upon the scientist to fulfill his promise and swallow the ship. Fortunately, the aforementioned Stephen Rogers wrote an account of the scenes along the quays and river when the steamship drew near the shore. He says: "On approaching Liverpool hundreds of people came off in boats to see the steamship. She was compelled to lie outside the bar until the tide should serve for her to go in. During this time she had her colors all flying, when a boat from a British sloop of war came alongside and hailed. The sailing master was on the deck at the time, and answered. The officer of the boat asked him, 'Where is your master?' to which he gave the laconic reply, 'I have no master, sir!' 'Where's your captain, then?' 'He's below. Do you wish to see him?' 'I do, sir.' The captain, who was then below, on being called, asked what he wanted, to which the officer answered, 'Why do you wear that pennant, sir?' 'Because my country allows me to, sir.' 'My commander thinks it was done to insult him, and if you don't take it down he will send a force that will do it.' Captain Rogers then exclaimed to the engineer, 'Get the hot-water engine ready!' Although there was no such machine on board the vessel, the order had the desired effect, and John Bull was glad to paddle off as fast as possible. On approaching the city the shipping, piers and roofs of houses were thronged with persons cheering the adventurous craft. Several naval officers, noblemen and merchants from London came down to visit her, and were very curious to ascertain her speed, destination and other particulars.

It is curious, in looking over the English newspapers of this time, to see how suspiciously the English authorities regarded the American steamer. America was looked upon as very ambitious, and an enterprise like this on the seas filled the British breast with great alarm. It seems that, Napoleon being now in captivity at St. Helena, his brother had offered a large reward to whoever should rescue him—or rather there was, it would appear, a rumor to that effect—and the British press was sure that this Yankee steamer was in European waters for no other purpose. The *Savannah* remained nearly a month in British waters, and while there Captain Rogers had jotted down in his log the following note of an unfortunate occurrence. It is here given *literatim*: "July 19, 1819.—These 24 hours begin with fresh breezes and rain. Captain Rogers told Mr. Blackman to go on shore after James Bruce and John Smith, to get them on board. They would not come; the watchman put them in the boat. John Smith tried to knock Mr. Blackman overboard; struck him several times; he swore he would take Mr. Blackman's life, but Mr. Blackman got him on board and he denied his duty, and then he was put in irons. Middle and latter part, fresh gales at southwest and rain." On the 23d of July the *Savannah* set out for St. Petersburg under steam. She stopped at Copenhagen and also at Stockholm, where, as in England, she was the object of general attention, being visited by all the members of the royal family and the nobles. Captain Rogers's diary says: "Mr. Huse (Christopher Hughes, the American Minister) and lady, and all the Furran ministers and their families, came on board." At St. Petersburg, where the steamer arrived in the early part of September, she was visited by the Lord High Admiral and members of the royal family. She sailed for America on October 10, and reached Savannah, Ga., November 30. While at Stockholm, Captain Rogers took aboard as an invited guest Lord Lynedock, an English nobleman, who made the journey to St. Petersburg aboard the steamer. When he left the ship he presented Captain Rogers with a massive gold-lined tea-kettle. This tea-kettle is yet preserved by the descendants of Captain Rogers. It bears the following inscription:

"Presented to Captain Moses Rogers, of the steamship *Savannah* (being the first steam vessel that had crossed the Atlantic), by Sir Thomas Graham, Lord Lynedock, a passenger from Stockholm to St. Petersburg. September 15, 1819."

Thus it will be seen that the *Savannah*, which, by the way, was lost off the south side of Long Island, anticipated the alleged steam pioneers *Sirius* and *Great Western* by nearly 20 years.



## A Petition from the Mechanical Engineers.

The following is the text of the petition recently submitted to the Senate from the American Society of Mechanical Engineers: To the Senate and House of Representatives of the United States in Congress assembled.—The American Society of Mechanical Engineers, mechanics and promoters of the industrial arts in the United States, many of whom are members of this society, would most respectfully petition that the affairs and condition of the United States Patent Office may be considered and investigated at your earliest convenience. The funds now raised by direct taxation from the inventors of the country, more than \$3,000,000 of which have already been directed from their intended channel, are more than sufficient to maintain the office in a condition of the highest efficiency; but partly by the reason of their diversion, the work of the office is greatly in arrears, and the rights of those by whom this tax is paid are thus most unjustly impaired.

To remedy these evils we respectfully submit that the efficiency of the Patent Office should be at once increased to an extent which will enable it promptly to bring up its work to date, and to conduct it hereafter with no delays other than are necessary to its proper performance, and we particularly urge that adequate provision be made for securing for the position of Commissioner of Patents a degree of talent and ability proportionate to its important function. This position involves executive and judicial duties of the highest order, and is fully commensurate in importance with those of the judges of the United States Courts. We respectfully submit that the compensation and tenure of this office should be placed upon a basis which will command the services of men of the best ability and of the highest legal attainments. In our judgment reform in this particular is not only more urgent than any other, but if effected will in due time result in accomplishing all others that are needed, by providing, first, for the proper and efficient administration of the Patent Office, and, second, for the placing before Congress of information and recommendations for further improvements of a kind and from a source which will command its confidence, and will thus facilitate such further legislation as may be required; and your petitioners will ever pray.

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E. D. LEAVITT, JR., Past President.  
JOHN E. SWEET, Past President.  
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J. FRITZ, Past Vice-President.  
HENRY NORTON.

**The Gun Foundry Report.**—The demand for the report of the Gun Foundry Board has been so great that the House of Representatives has authorized the printing of another edition. This board, it will be remembered, was organized under act of Congress March 3, 1883, composed of six officers selected from the army and navy for the purpose of examining and reporting to Congress which of the navy-yards or arsenals owned by the Government has the best location and is the best adapted "for the purpose of establishing a gun foundry board for the manufacture of heavy ordnance adapted for modern warfare." In the course of its investigation the board visited England, France, Russia and Germany, and collected most valuable and important information.

On February 18 Messrs. P. H. Miller and John R. McCune, trustees of Graff, Bennett & Co., issued the following circular to the creditors of the firm: "We have been notified by Messrs. Graff, Bennett & Co., that they are unable to meet the bonds due February 20, issued under their extension. After having promptly paid the first four installments of their indebtedness we very much regret their inability to meet their further engagements as they mature, but the present condition of the iron trade seems to make it impracticable. To foreclose the mortgage and sell the mills under present conditions would be alike disastrous to debtors and creditors, and some of the larger creditors are informally considering the propriety of a further extension of time. It is probable that a formal meeting of creditors generally will be held within a few days, of which you will have due notice." Rumors of an action of this nature being contemplated have been on the street for some days, but neither the trustees nor members of the firm would talk about them, taking the ground that it was a matter of private business. Since the extension was granted to the firm, from \$600,000 to \$700,000 have been paid, and the present depressed state of trade is reported to be the reason for asking for an extension on the payment that will soon be due. It is said, too, that the firm desires to consolidate all its debts into one loan. No trouble is anticipated, as it is expected that the creditors will readily accede to the request.

Commodore Walker, chief of the Bureau of Navigation, has prepared for publication a paper in relation to the variations of compasses caused by magnetism of iron and steel ships. A testing-house will shortly be built in which to examine and test all the compasses of the navy, and such of those in use in the merchant service as the owners thereof may desire. There is no location in New York Bay practicable for a compass station, and therefore one was established last November in Narragansett Bay.

By the passage in Congress of the Texas Pacific Forfeiture bill, which will doubtless be signed by the President, 15,000,000 acres of land, valued at \$40,000,000, will be restored to the public domain.

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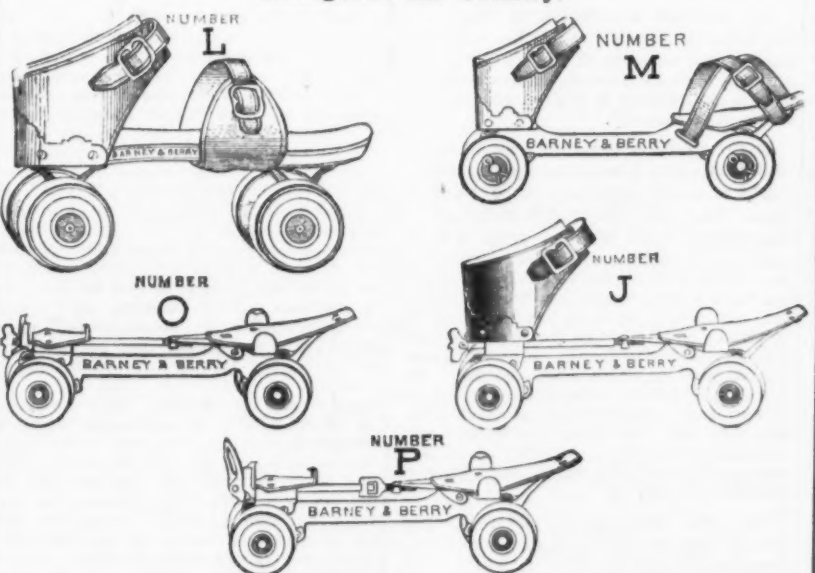
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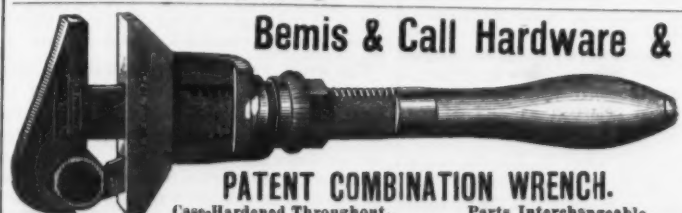
CROWN & CUMBERLAND STEEL CO. CROWN CAST TOOL STEEL,  
For Taps, Dies, Chisels, Drills, Shear Knives, &c. Warranted equal in quality and uniformity to any English Steel. Sole agents for the

HARTMAN STEEL CO., Pittsburgh, Pa.  
Machinery Steel, Spring Steel, Steel Tire in sets, Toe Calk Steel, Sleigh Steel, Axle Steel, Boiler Plates, Iron or Steel, Tank, Stack and Sheet Iron, Bar Iron, best Refined and Intermediate Brands. Norway Iron, Bars and Shapes.

We are Sole Agents for W. S. SIZER'S STEAM FORGE, BUFFALO, N. Y.



We can furnish you with Forgings of any size, either Iron or Steel, plain, forged or rough, turned any diameter up to 30 inch, 35 feet long.



Bemis & Call Hardware & Tool Co.

PATENT COMBINATION WRENCH.

Case-Hardened Throughout. Parts Interchangeable.

This Wrench not only combines the superior qualities of a Gas Pipe Wrench, but also all the requisite combinations of a regular Nut Wrench, thus making a combination which has no equal.



No. 3 PATENT PIPE WRENCH.

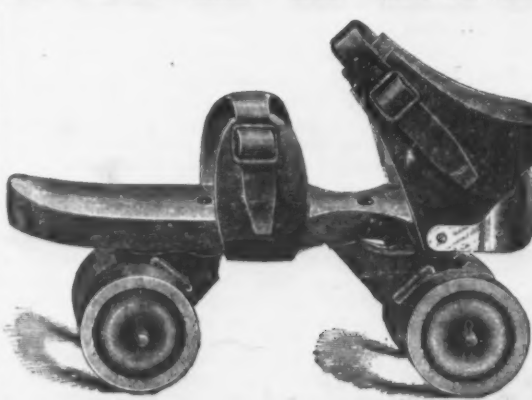
The serrated jaws of the Wrench are interchangeable; that is, the same serrated plate may be used for either the stationary or sliding jaw, so that if one plate is broken another can be furnished adapted to either jaw without express designation. The sliper, nuts and various parts are also interchangeable, thus easily repairing the Wrench at very small expense, and with as perfect practicability for further use as when the Wrench was new. For Circulars and Price List, address

BEMIS & CALL HARDWARE & TOOL COMPANY, Springfield, Mass.

POPE & STEVENS'

Columbia Rink Skate.

This Skate is made of the finest material, and for strength, durability and ease of action not surpassed. All parts and pieces are interchangeable.



114 Chambers St., NEW YORK.  
514 Commerce St., PHILADELPHIA, PA.



LATEST LEGAL DECISIONS.

FIRE INSURANCE OF STEAM-POWER ELEVATOR AND BUILDINGS.

C. sued to recover for the loss of an elevator building and additions. The fire occurred on September 20, the notice of loss was sent by telegraph on September 20, the proofs of loss were made on December 22 and the action was begun on December 24. In the terms of the policy the loss was to be forthwith notified to the company, and a particular statement made in writing as soon as may be, "under oath, and all losses shall be paid within 60 days after the first meeting of the Board of Directors or Executive Committee held subsequent to notice as aforesaid of such loss." Also, "it shall be optional with the company to repair, rebuild, &c., giving notice of such intention within 30 days after the receipt of proofs herein required." The Executive Committee met twice in each month. The company defended on two grounds: 1. That it was not liable for the loss of a warehouse within 2½ feet of the elevator, which was fastened to the elevator by 20 strips of board. (This warehouse was used exclusively for storing grain, which was received first into the elevator and then spouted into the warehouse through two spouts which extended from one building to the other, and the grain was taken from the warehouse by a conveyor running under the warehouse and elevator. This warehouse was not used except for and through the elevator.) 2. That the action was prematurely brought, there being no

amount due by W. to M. was a definite sum, and when a certain sum is due on a contract a recovery can be had upon a promise by a third person to pay it. The suit will be sustained on the promise; it need not be brought as upon a contract, but as for money had and received to the plaintiff's use."

STATE INSOLVENT LAWS.

N. sued H. for a debt. They were citizens of different States, and H. having been discharged under the insolvent laws of his own State set up that discharge in defense of the suit. It was admitted that N. did not appear in the insolvency proceedings; did not prove his demand against H. therein, or in any way share or participate in the distribution of the estate surrendered. N. argued that this defense was not sufficient to defeat his claim, and the court decided in his favor. The case—*Newton vs. Hagerman*—was carried to the United States Circuit Court for the District of Nevada, where the court below was sustained. Judge Sabin, in the opinion, said: "The question raised here is this: What, if any, extra-territorial force or effect have State insolvent laws? If these laws have no force or effect beyond the limits of the State, and are applicable only to contracts between citizens of the State made subsequent to the passage of the insolvent laws, then the matter pleaded in the answer is a bar to plaintiff's recovery in this action. We consider it settled in the Federal and State courts that the insolvent laws of one State cannot discharge the contracts of citizens of other States, because they have no extra-territorial operation,

As a basis for legislation on the subject this report is of much value, and it is to be hoped that such laws will be passed as will conduce to a better sanitary condition of the homes of the poorer classes. But, while undoubtedly there are many evils which demand State correction, the greatest reform needed is the effectual enforcement of existing laws, which at present are too little regarded.

New Milling Machines.

The accompanying engravings illustrate what is known as a No. 2 plain milling machine, built by Mr. F. E. Reed, of Worcester, Mass. It is a very heavy and substantial tool. The bed is 16¾ inches wide and 6¾ inches deep. The spindle is of hammered steel, mounted on a heavy square slide, which is jibbed to both sides of large upright, and is raised or lowered by a single screw. It is held in position by ¾-inch bolts, and has a stop-screw under each end of slide. By this arrangement the greatest rigidity and accuracy are secured. The spindle gear is 16¼ inches diameter, and driving gear on cone shaft is 4 inches diameter. The gears are connected by a yoke, and are not thrown out of gear by adjustment of spindle. The table is 33¼ inches long and 7 inches wide, and has an automatic feed motion adjustable at any point. The vertical adjustment of the spindle is 8 inches. The counter-shaft has tight and loose pulleys, 12 inches diameter, and should make 125 revolutions per minute. The cone

proper condition. They refer to this as an important improvement over other mowers which provide for taking up the wear in but one direction. The "Acme" is geared, it will be seen, at both ends, and cuts to within 1 inch of each extreme outside end. The traction rolls run inside the frame of the machine, and thus, the manufacturers say, do not roll down the grass like a side-wheel machine. The pawl and ratchet used in the "Acme" is referred to as an entirely new principle in pawl and ratchet motion, and as being silent, positive and durable. The handle is a vibrating one, and may be in-

wrench in combination with a similar curve reversed, which characterizes the moving part. The end of the shank is serrated, thus avoiding liability of sliding. The wrench is adapted for turning round, square, oval, octagonal, hexagonal and all other shapes, and is guaranteed by the maker not to slip. It is positive in its hold on pipe. The wrench is made by the drop-forging process from steel, and is said to be tempered to stand hard use. Its range covers all that a wrench is commonly used for. From the price list before us we learn that six sizes are made, ranging from 10 inches up to 30 inches. The



The "Climate" Pipe Wrench.

stantly attached or detached from the mower for convenience in storing, and is provided with a half-lock which allows of the knives being raised to avoid accident when being drawn to and from the lawn. A brace extends, it will be perceived, across the front of the mower and prevents the knives from coming into contact with trees and other obstacles. A center traction roll provides for keeping the mower level while cutting narrow borders. The arms of the front truck-wheels encircle the journals of the cutting cylinder, giving, the manufacturers claim, the greatest possible range in height of cut. The whole machine is described as being made and strongly built, every part being made to gauge and with interchangeable parts, and is put on the market by the manufacturers with high claims for its excellence. We may add that other styles of these mowers are represented in the company's advertisement on page 34.

The Harvard Roller Skate.

The accompanying illustration, Fig. 1, gives a general view of the skate above named, which is manufactured by the Harvard Roller Skate Company, 235 Washington street, Boston, and Fig. 2 a sectional view of the rocker and adjustable box which holds the cushion. To this construction, which is covered by a patent dated March 4, 1884, the manufacturers direct special attention as constituting the principal novel feature of the skate. A section of the box holding the rubber cushion is shown in this cut, to understand the operation of which it is to be remembered that the upper portion of the box is movable, sliding up or down according to the motion of a wedge between it and the foot-plate of the skate above it. This wedge and the screw by which it is operated are not represented in the sectional view, but can per-

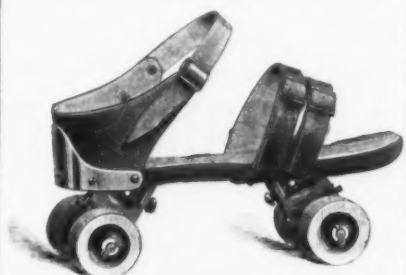


Fig. 1.—The Harvard Roller Skate.

haps be recognized in Fig. 1. By turning this screw the wedge between the foot-plate of the skate and the upper part of the box is forced in, thus giving increased pressure on the cushion and making up for its wear. By this screw and wedge the box can be raised or lowered at pleasure, the manufacturers directing special attention to the point that by this means a uniform tension may be preserved and the movement of the rocker regulating the action of the skate made to suit the wearer. The manufacturers regard this as a very desirable feature in the skate, as it enables the skater to regulate the tension and to take up the wear of the cushion by keeping it at the same point of rigidity during the entire life of the cushion. There is, we may add, a groove running through the bottom of the cushion, and a corresponding elevation in the box, so that the cushion cannot slip, and the pressure is always toward the center. In their circular describing this skate the manufacturers represent the different styles which they

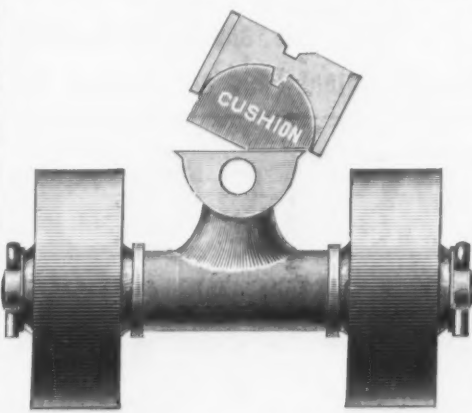


Fig. 2.—Sectional View of Rocker and Adjustable Box.

put on the market, and call attention to other features of excellence which they claim in the skate.

The "Climate" Pipe Wrench.

The accompanying engraving represents a very efficient Pipe Wrench which is being introduced by John G. Maynard, No. 12 Cortlandt street, New York. It will be seen that the hold or grip on the pipe is obtained by the peculiar curve given to the shank of the

smallest of these has a capacity of 6 to ½ inch, and the largest from 1½ inches to 4 inches. The sample which has been submitted for our examination seems to show all the special merits to which the maker directs attention.

The "Boss" Ash and Garbage Can.

Messrs. Henderson & Stoutenborough, 270 and 272 Pearl street, New York, manufacturers of house-furnishing goods, have placed on the market a new style of Ash and Garbage Can, known as the "Boss." From the accompanying cut the general merits of the can may be judged. It is made, as is



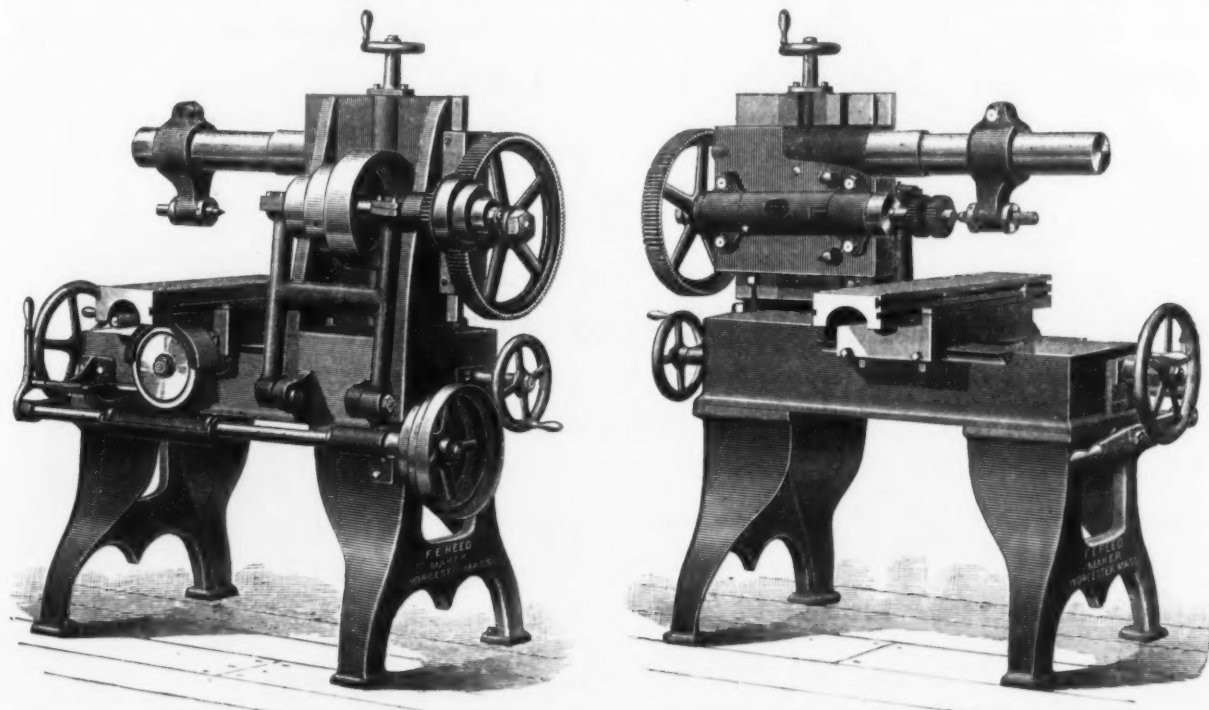
The "Boss" Ash and Garbage Can.

shown, of strips of galvanized iron fastened together at the edges by folded ribs. The bottom is of a single sheet, flanged and riveted to the sides, and is strengthened by two strips of iron crossing at the middle. The can, for greater strength, is made somewhat bulging, in the form of a barrel, instead of having straight sides, as is the usual method. For convenience in moving, handles are riveted to the sides, as shown in the cut. In the garbage-cans all the seams are soldered, so as to make them water-tight. The cans are made in four different sizes of black japanned and galvanized iron, and, where desired, covers are provided at a small additional cost. In our Trade Report, in another part of this issue, we publish the prices of the different sizes and styles of these cans.

Results of the French Bounty System.

As having a direct bearing on the question of ocean mail subsidies, we again refer to the French bounty system, which went into operation about four years ago, and is now made the subject of an official report. The first effect was to stimulate shipbuilding far in excess of commercial requirements. Thus, in 1880, before the passage of the law, the long-voyage tonnage under the French flag was 3,633,078, but by the end of December, 1882, or during the first year of the bounties system, it had increased to 4,722,796—a gain of 1,089,718 tons, the profits, as a rule, going to the British shipbuilder rather than to the French. The returns down to January 1, 1884, show that the total bounties paid during the previous two years was 16,700,000 francs, or about \$6,175,000. Nearly 13,000,000 francs, or over three-quarters of the whole sum, was taken by the iron ships, steam and sail. Of these, 92 steamers and 32 sailers were built in Great Britain, and there were some few from other countries. Evidence of the failure of the system is beyond dispute. A London correspondent of the *Times*, writing on the 31st of last month, says: "The full extent of this failure cannot be told until the returns for 1884 are at hand, but from the report of a single company, the Chargeurs Reunis, some idea can be gained. In the two years immediately preceding the operation of the bounties law, this company, which has over a score of steamers in the South American trade, earned dividends of from 3½ to 4½ per cent. In 1882, the first year of the law, the dividend rose to 15 per cent., and in 1883 it was 12½ per cent. This year the stockholders are told that it will be impossible to pay any dividend whatever, notwithstanding the fact that the line must have received between \$300,000 and \$400,000 in bounties from the Government during the year." In the light of the facts the United States are not likely to repeat the blunder of a bounty for tonnage, whatever may be the final decision in respect to our decaying mercantile marine. That heroic treatment of some kind may be called for none can deny.

Lieutenant Schwatka, speaking of Alaska, says the fur company, which virtually controls that territory, is making enormous profits, and that the whale fishery alone is worth \$1,000,000 per annum.



NEW MILLING MACHINES, BUILT BY F. E. REED, WORCESTER, MASS.

right of action until 60 days after the meeting of the directors or Executive Committee subsequent to the service of the proofs of loss. (There was so suggestion that the proofs of loss were not made in time.) The company was defeated and carried the case—*Cargill vs. Millers' and Manufacturers' Mutual Insurance Company*—to the Supreme Court of Minnesota, where the judgment was affirmed. Judge Dickinson, in the opinion, said: "1. The warehouse served the same purpose, and no other, than as a bin in the elevator building. It was used as a part of the elevator, and was so connected with it that, in view especially of this use, it must be considered as having been intended by the parties to be included in the designation 'elevator building and additions.' 2. The notice of the loss, which the insured is required by the policy to give in writing 'forthwith' upon the occurrence of a loss, and the statement or proof of loss to be rendered 'as soon as may be' are distinct. The one is essentially a notice, and is so designated in the requirement to 'notify' the secretary; the other, which in the policy is called a statement, is not of the character of a mere notice. In the law of insurance it has come to be known as the 'proofs of loss' or 'preliminary proofs,' and is elsewhere in the policy referred to as 'the proofs herein required.' The most natural, if not the necessary, construction of the instrument is to read the words 'notice as aforesaid of said loss' as referring to the notice of loss, and not to the proofs of loss. This conclusion is further supported by the principle which requires us to construe liberally in favor of the insured those provisions of the contract made for the benefit of the insurer and expressed in a form deliberately selected by it."

CONTRACT—AGREEMENT TO PAY THE DEBT OF ANOTHER.

W. was indebted to M. and a lumber company were indebted to W., who requested them to pay M., who released W. from his debt, and the company charged the amount on their books to W. The company refused to pay M., claiming that as they had not made the promise to pay the debt in writing they were not bound. M. got judgment, and the company appealed the case—*Malcrone vs. American Lumber Company*—to the Supreme Court of Michigan, where the judgment was affirmed. Judge Champlin, in the opinion, said: "This transaction was valid and rests upon a sufficient consideration. It was a mode of paying W. so much on account of his contract with the company. M. does not rely upon the request of W. to pay, but upon the company's agreement to pay, which made a new contract between them—a novation. The statute of frauds, requiring the promise to pay the debt of another to be in writing, has no application to a case like the present. The rule is well settled that where a party who was not before liable undertakes to pay the debt of a third person, and, as a part of the agreement, the original debtor is discharged from his indebtedness, the agreement is not controlled by the statute of frauds. The

and, consequently, the tribunal sitting under them, unless in some cases where a citizen of such other State voluntarily becomes a party to the proceedings, has no jurisdiction in the case. Legal notice cannot be given, and, consequently, there can be no obligation to appear, and, of course, there can be no legal default. The debt attends the person of the creditor, and, unless he is within the jurisdiction of the court, no discharge granted by it can affect his rights. It is a question of citizenship, and State courts and State laws are powerless to affect the rights of non-resident creditors by any jurisdiction they may have or exercise over the person of the debtor, or by any proceedings *in rem* affecting the debt itself."

RAILROAD—EJECTION.

B sued a railway company for damages for being ejected from its train by a conductor. It appeared that he got on the train to go to another way station without a ticket, expecting to pay 20 cents, as he had done before, but, on being told that he must pay 10 cents more on the train, he said he ought not to be required to pay so much, and, in a good humored manner, said to the conductor that he would get off if he would stop the train. The conductor immediately pulled the bell-cord, and though B offered the fare demanded, at once, and before the train stopped, he forced him to leave the train. B. had a judgment, and the company carried it—*Texas and Pacific Railroad Company*—to the Supreme Court of Texas, where it was affirmed. The Chief Justice (Willie), in the opinion, said: "B was not a trespasser. The difference between him and the conductor was in discussion only. He was bound to accept the fare if tendered before B. had to leave the train."

The report of the Tenement House Commission, presented a short time ago to the New York State Senate, comprises a series of documents covering the result of the inspection of nearly 1000 tenements out of an estimated total of 26,000 in New York. The percentage in tenements of the total number of deaths in the city, which has increased from 51.11 per cent. in 1870 to 56.50 per cent. in 1884, sufficiently explains the necessity of some reform in this matter. In a supplementary report by the chief inspector, Mr. Frederick M. Owen, it is stated that the number of tenements needing an inspection of plumbing is very large, and that it is impossible to make owners or tenants obey sanitary laws without systematic inspection, which it is impossible to have with the present small force of inspectors of the Health Department. The report says that the tenants generally appreciate the necessity of sanitary regulations, and that they are more advanced than would be judged from their surrounding conditions. While in their present state the tenement-houses, in the vast majority of cases, are sadly in need of reform, it is encouraging to be told that the sanitary condition of the older houses has greatly improved during the past five years,

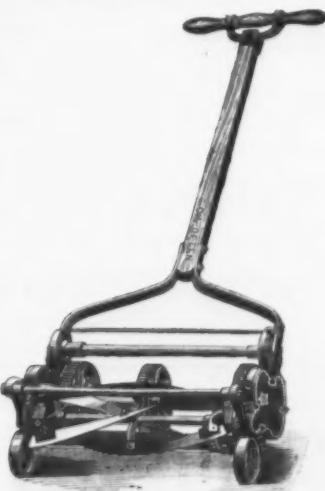
pulley has three changes for a 3-inch belt. The weight of the tool is 2035 pounds.

The No. 1 or smaller machine weighs 1700 pounds, and is the same as No. 2 in everything except size. Mr. Reed has furnished two lots of the No. 2 machine to the United States Government for use in one of the armories, and they have proved very satisfactory.

HARDWARE NOVELTIES.

The "Acme" Lawn Mower.

The Blair Mfg. Co., Springfield, Mass., for whom Loudnerback, Gilbert & Co., 33 Chambers street, are agents, are putting on the market the "Acme" Lawn Mower, which is represented in the accompanying illustration, which shows one of their medium sizes. Of this mower for hand use they make the



The "Acme" Lawn Mower.

following sizes: 10, 12, 14, 16, 18, 20 and 24 inch. The 14, 16, 18 and 20 inch have a roller in the middle, as represented in the cut, for the purpose of supporting the machine for cutting borders. The 10 and 12 inch have a roller at each end, without the middle roller, and the 24-inch have double traction rollers in the middle. In putting this lawn mower on the market the manufacturers refer to the quality of material and workmanship, and direct attention to the following points in its construction: The cutting cylinder is made with four spiral knives instead of three, as in other mowers, a feature to which they refer as having important advantages. The shaft of the cutting cylinder is of steel, and it is described as having bearings which are capable of such adjustment that, no matter how much worn the shaft becomes, the lost motion in all directions may be taken up and the bearings always kept in

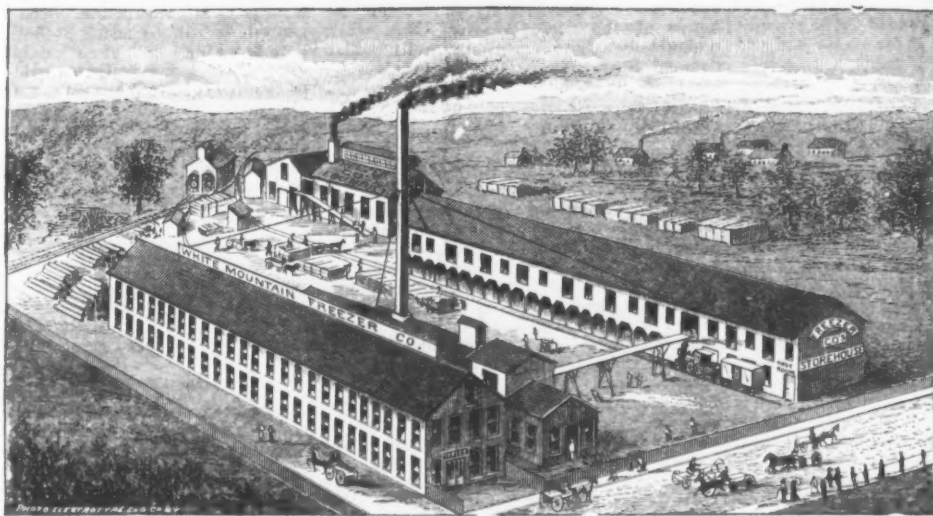


# White Mountain Freezer Co.



NEW PLATFORM FREEZER.

Sizes, 15, 20 and 25 quarts.



THE LARGEST FREEZER WORKS IN THE WORLD.



POWER FREEZER.

Ready to operate. Sizes, 25 to 50 quarts.

## ICE CREAM FREEZER

Buy Sands' Triple-Motion "White Mountain."

The only Freezer ever made or patented having three motions. Can turning one way. Outside Beater and Cream Scraper combined, with floats extending to center, turning opposite to Can. Inside Beater, with floats extending outward, turning opposite to Outside Beater, thereby making three simultaneous motions, and producing fine, smooth cream.

It is Utterly Impossible for any Single-Beater Freezer to Produce the Same Results.

They freeze quicker than any other on the market, thereby saving time, ice and salt. The Tubs are chemically filled and are Water-Proof.

NO ZINC IN CONTACT WITH CREAM, BUT TIN INSTEAD. OXIDE OF ZINC IS A WELL-KNOWN POISON.

"Never put anything into the Human Stomach prepared in vessels coated with Zinc."—The Metal Worker.

All Outside Irons Galvanized. Packing Tubs and Cans, All Sizes, Wholesale and Retail

Sold by the Trade everywhere. Send for Circular and Price List of the Celebrated Freezer. Address

White Mountain Freezer  
Ready to Operate.

Sizes, 2, 3, 4, 6, 8, 10, 15, 20, 25 and 50 quarts.



Sands' Family Ice Crusher.

## WHITE MOUNTAIN FREEZER CO.,

101 East Hollis Street,

NASHUA, N. H.

## BLAIR MANUFACTURING COMPANY, SPRINGFIELD, MASS., U. S. A.

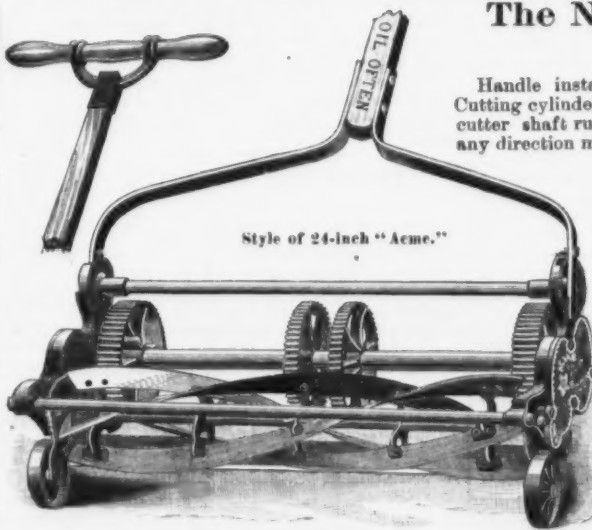
THE IMPROVED  
"Easy" Lawn Mower.

The only practical  
FORWARD-CUT  
ROLLER MOWER  
ever on the market,  
combining Durability  
with extreme Light  
Weight.

Style of Medium-Size  
"Easy."

Catalogues and Price Lists on  
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Style of 24-inch "Acme."

The New "Acme" Lawn Mower.

MERITS OF CONSTRUCTION:

Handle instantly attached or detached without touching the Mower. Cutting cylinder has four knives, all tempered to a standard. Steel cutter shaft running on Steel gibs so arranged that all possible wear in any direction may be compensated for. Patent cam pawl and ratchet, absolutely positive, silent and durable. Truck wheels run on hardened steel studs, protected from dirt, &c. Truck arms encircle cutting cylinder journals, giving greatest possible range in height of cut. Powerful traction. Perfectly silent. Easily operated. All sizes geared at each end. Every part made to standard gauges, and interchangeable.

RANGE OF WORK.

Cuts high terraces with rope attachment, cuts borders, cuts mounds, cuts over holes, cuts within one inch of a wall, fence or tree. Cuts wet grass without clogging. Cuts heavy, tough grass with comparative ease, and especially adapted to cemetery work.

Style of Medium-Size  
"Acme."

## MECKLENBURG IRON WORKS, CHARLOTTE, N. C., JOHN WILKES, MANAGER.

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Stamp Mills and Pumps for Gold Mines, and Mining Machinery of every description; Steam Engines, Portable and Stationary; Boilers and Saw Mills, with Reamy's Patent Feed and Backing Device. Also Manufacturers of the Celebrated Centennial Cotton Press.

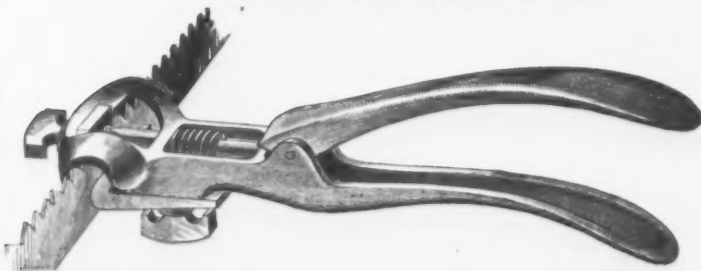
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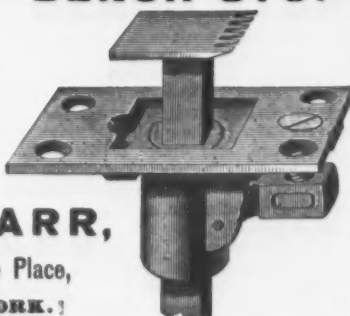
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FOR SETTING EVERY VARIETY OF SAWS.



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## STEEL NAILS

Fig Iron, Bar Iron, Bar Steel, Steel Blooms, Steel Billets,  
Small T Rails, Flat Rails of Iron or Steel, Fish Bars of Iron or Steel.

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Wm. Rogers' German Silver and Plated Spoons and Forks. Send to SIMPSON, HALL, MILLER & CO.,  
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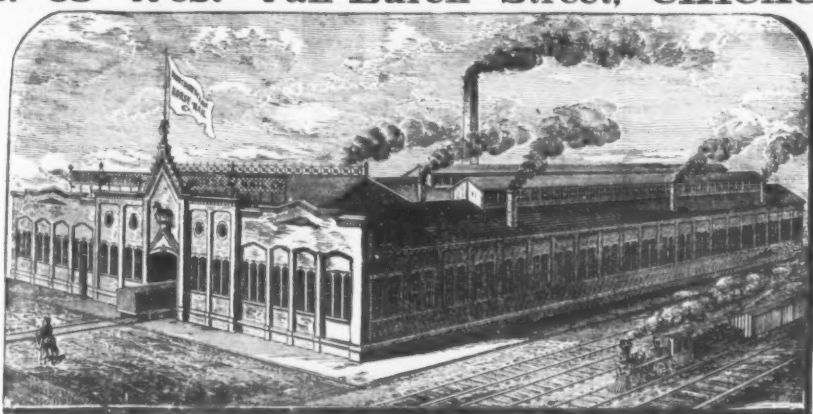
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Regular Head.



OUR NAILS are manufactured from the finest brand of Swedish Iron, of which we use the entire product.



IN QUALITY, uniformity of shape and style, they are unequalled.

They are the safest nail to drive.

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For Sale by All the Leading Houses Throughout the United States.

COLD TEST OF IRON USED EXCLUSIVELY BY NORTHWESTERN HORSE NAIL CO.

A. W. KINGSLAND, Secretary.

THE CUT BELOW represents our latest patent "Wonder" Cross-Cut Saw, of which style of teeth we shall use for our Cross-Cut One-Man Pruning and Buck Saw. This tooth has all the direct fast cut of the Lightning, combined with the clearing teeth of the Champion, making it, as its name indicates, the Latest Wonder, and by actual test we decide an advantage of 20 per cent. over our former world-renowned Lightning Saw. Having newly organized January 26th, 1885, as the E. M. Boynton Saw and File Co., we shall be prepared to fill any orders for the above, as well as for goods which have been furnished our customers throughout the world for the last 14 years.

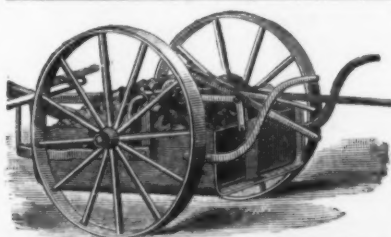
Respectfully yours,

E. M. BOYNTON SAW AND FILE CO.

THE WONDER CROSS CUT SAW.

E. M. BOYNTON SAW & FILE CO.  
BOYNTON BROS.  
LATEST PATENT.  
E. M. BOYNTON, PRESIDENT.  
C. W. BOYNTON, VICE PRES.  
N.Y. CITY.

PATENTED NOV. 25<sup>TH</sup> 1884.



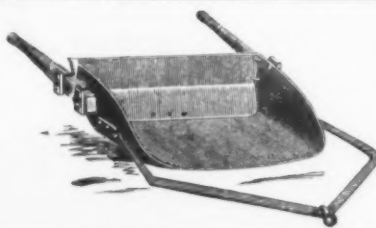
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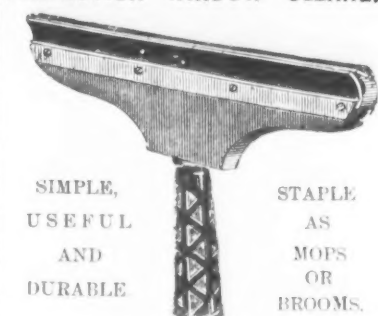


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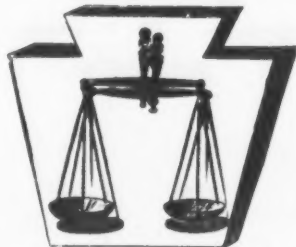
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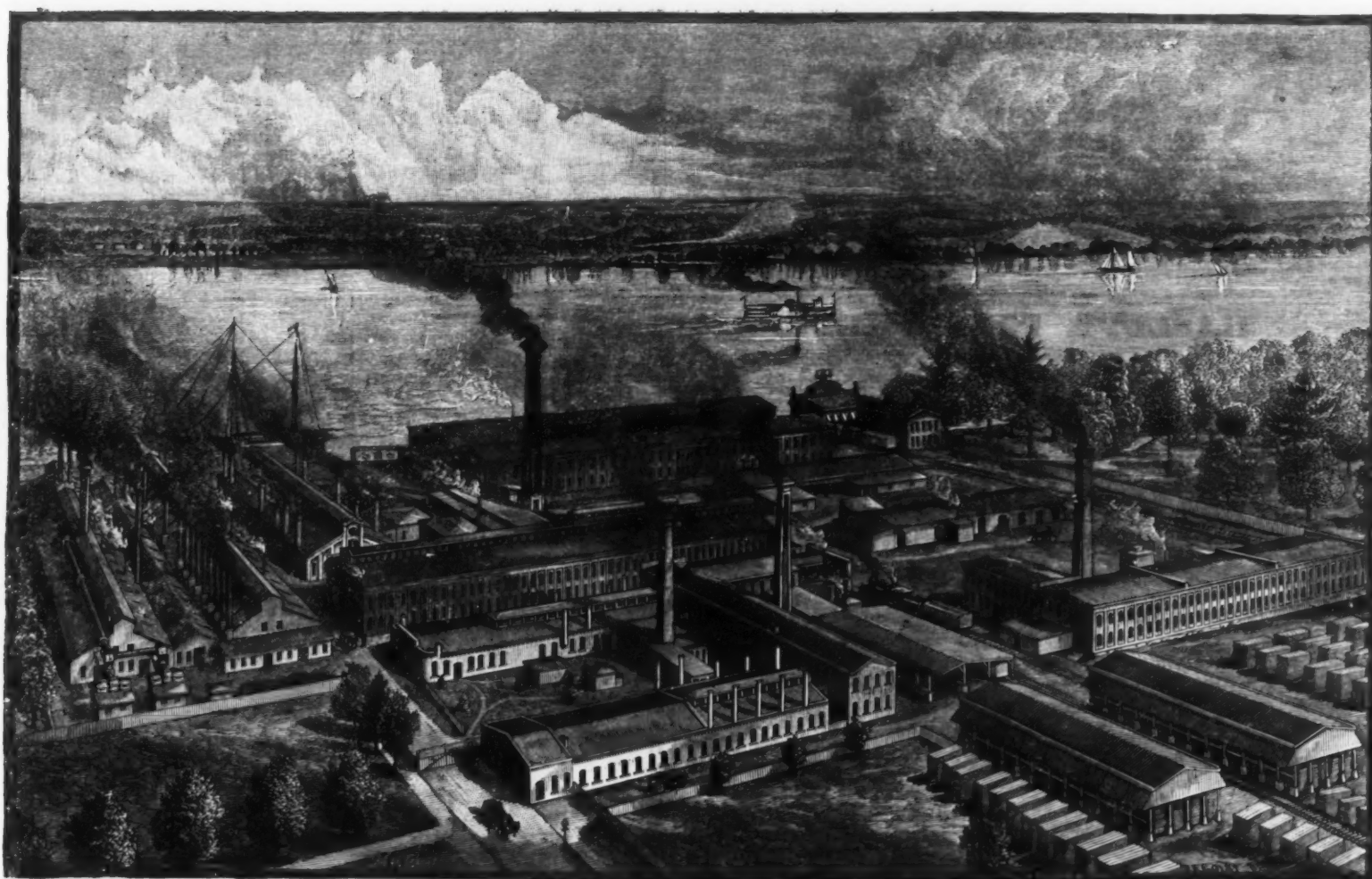
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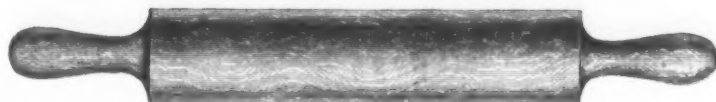
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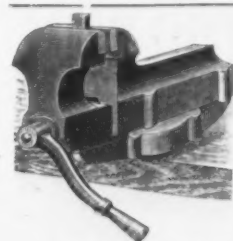
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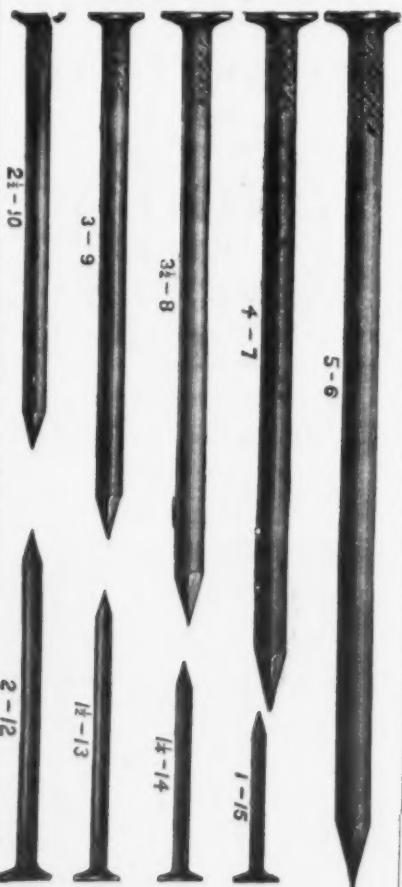
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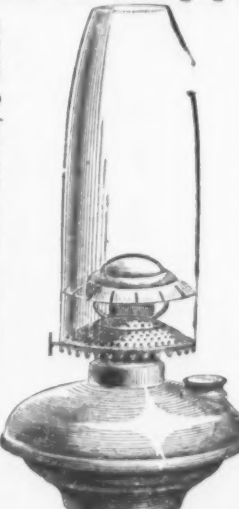
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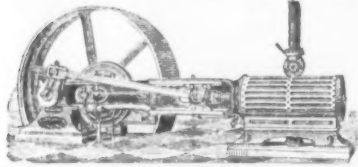
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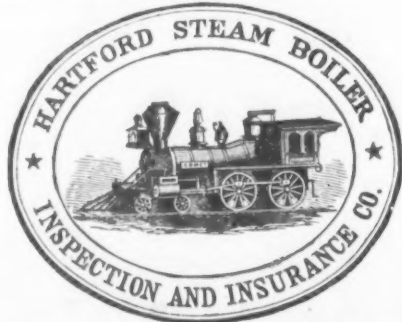


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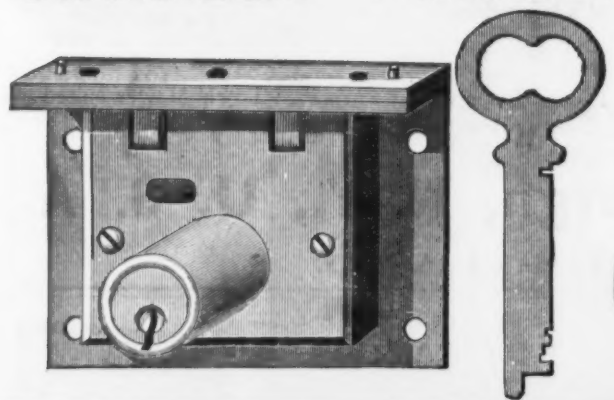
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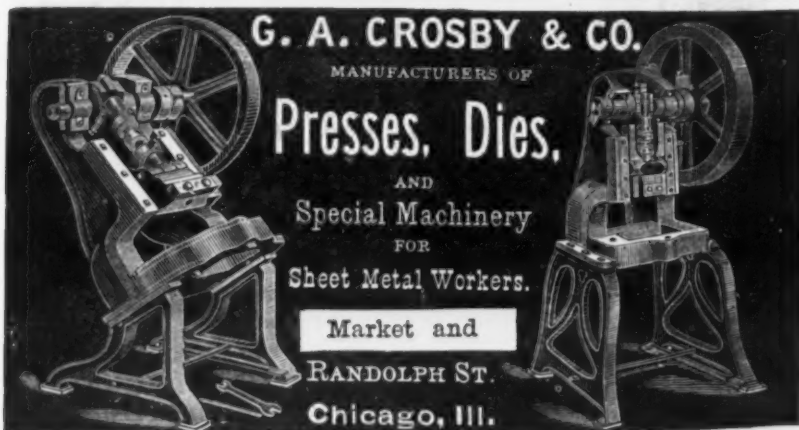
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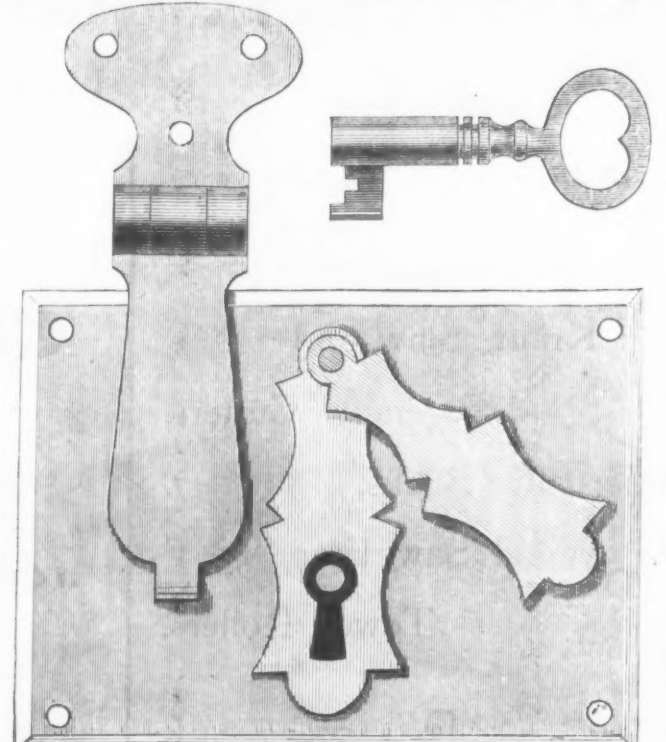
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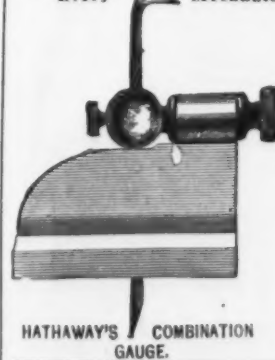
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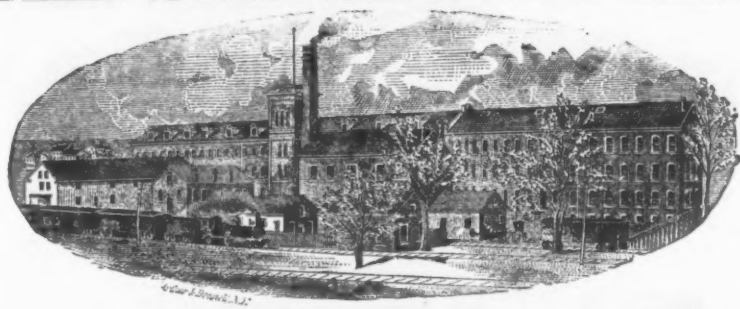
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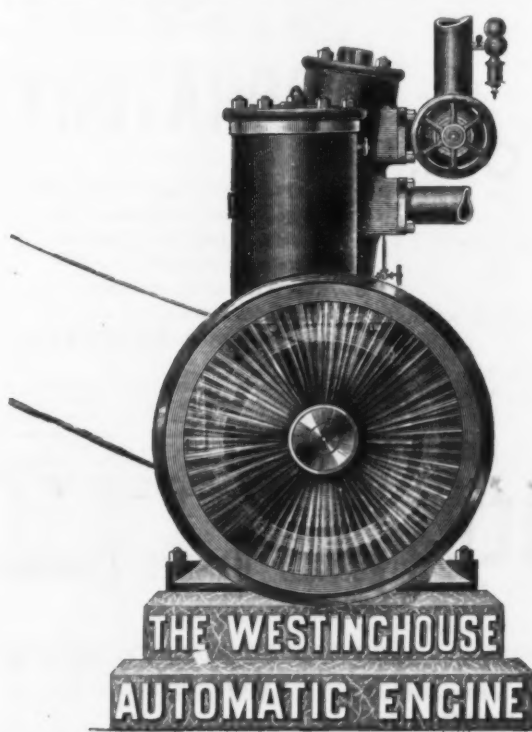
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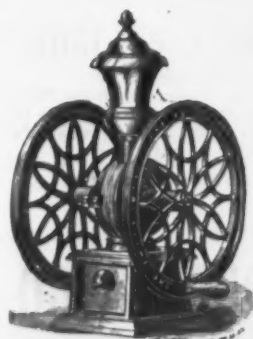
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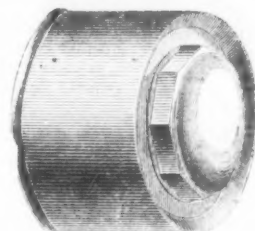
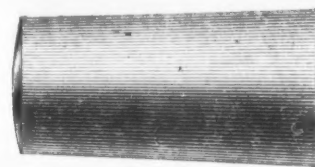
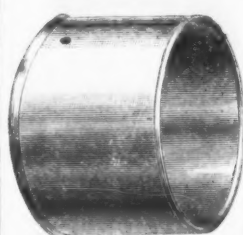
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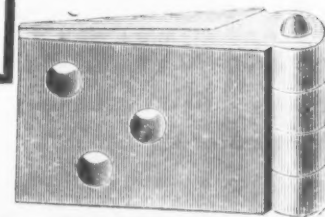
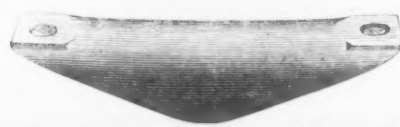
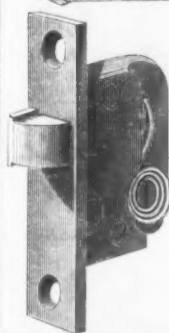
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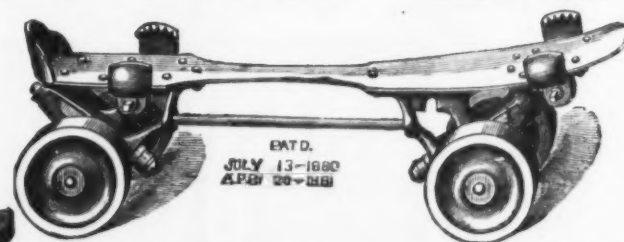
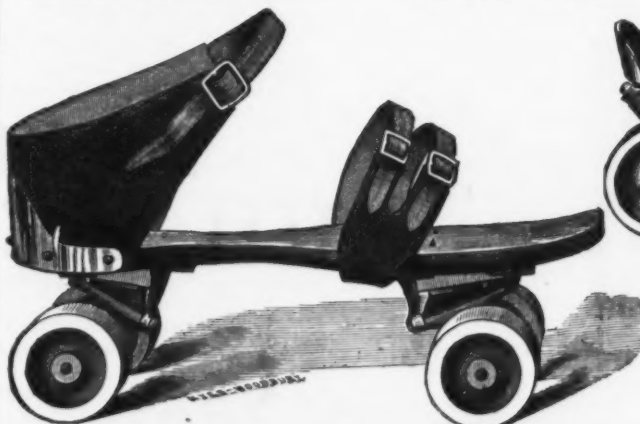
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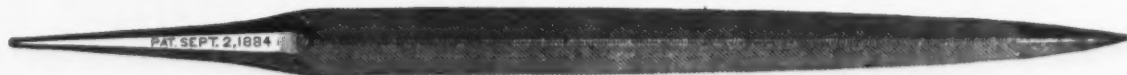
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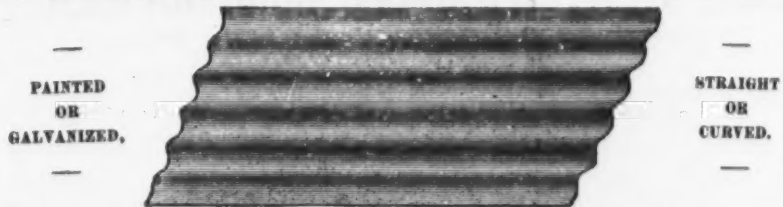
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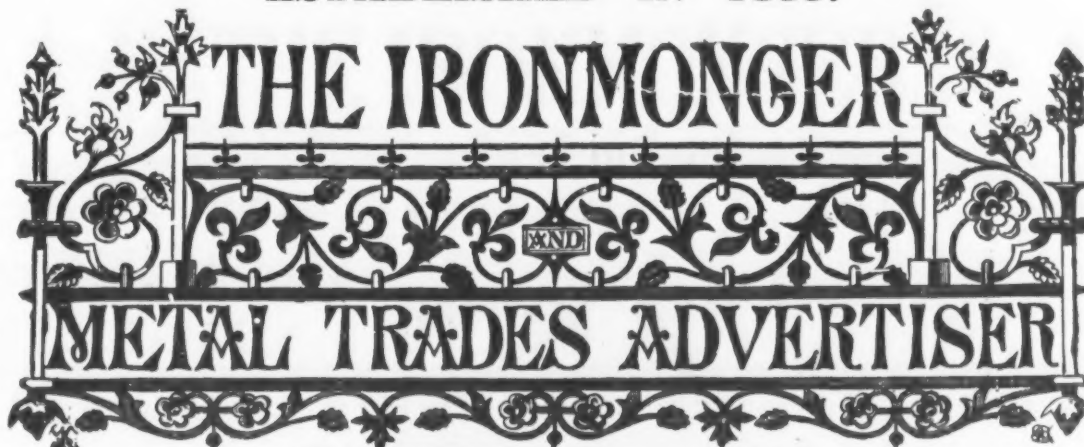
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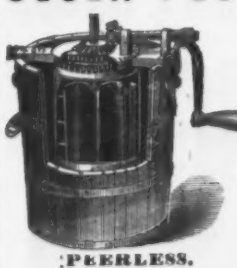
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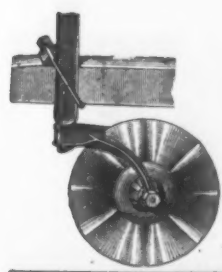
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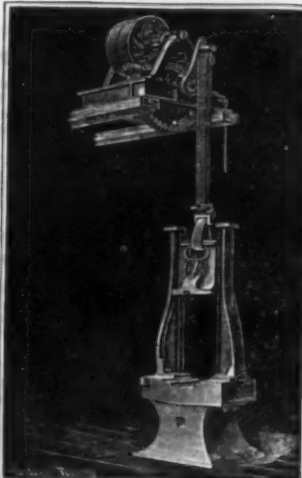
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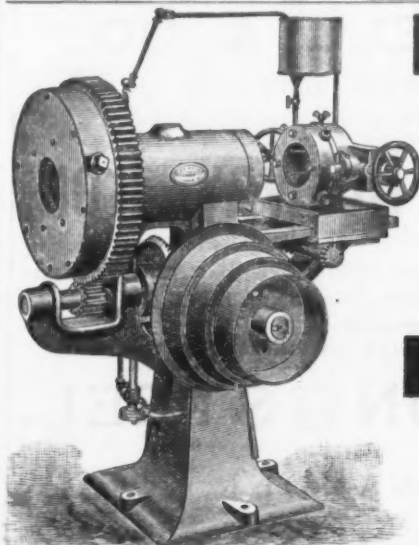
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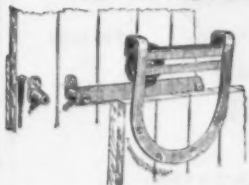
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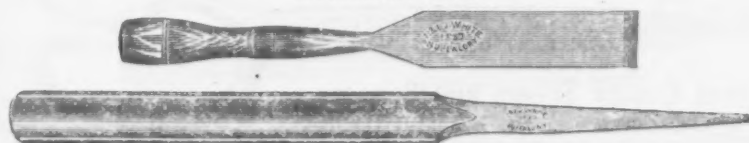
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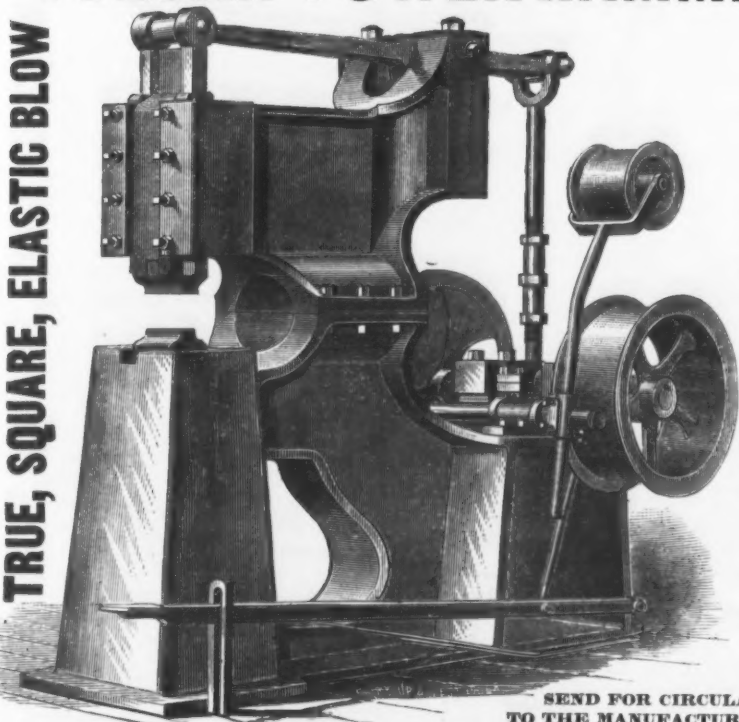
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Walton Saw 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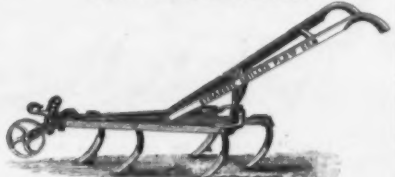
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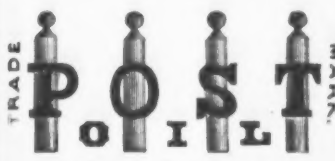
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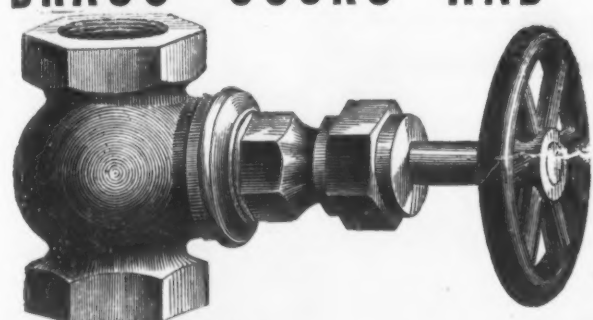
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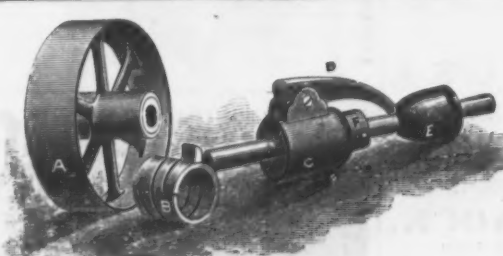
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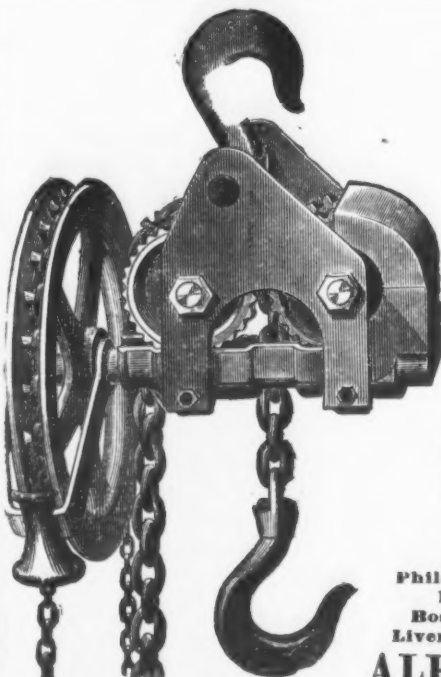
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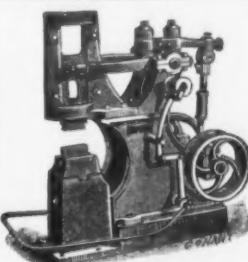
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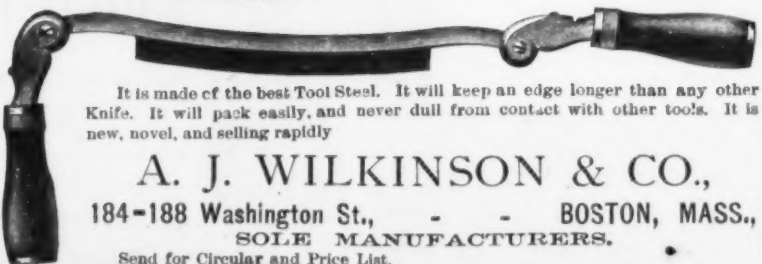
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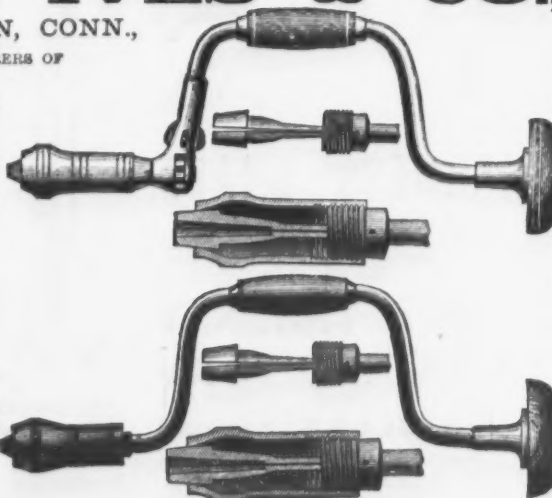
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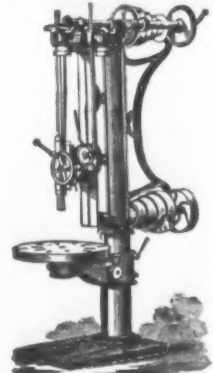
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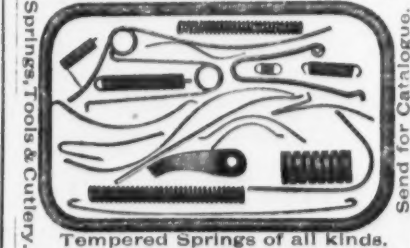
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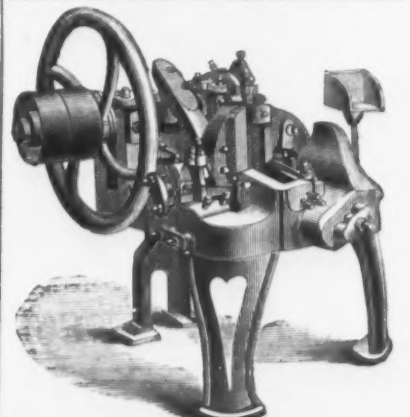
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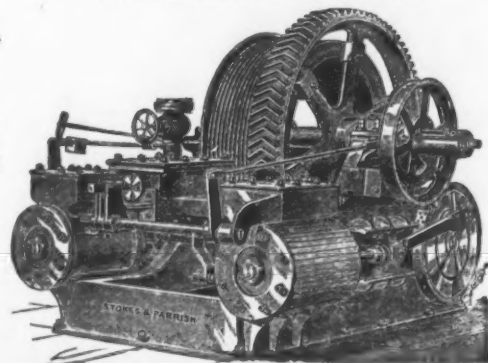


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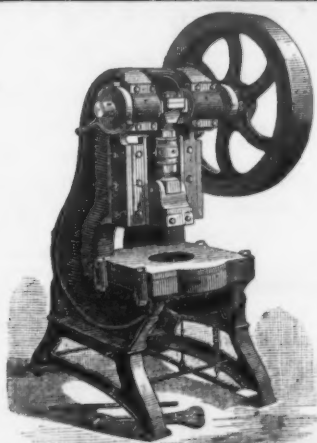
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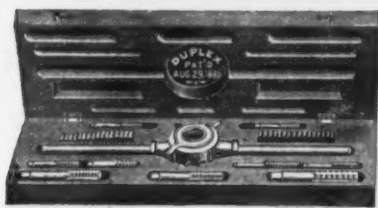


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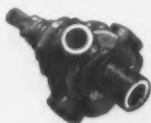
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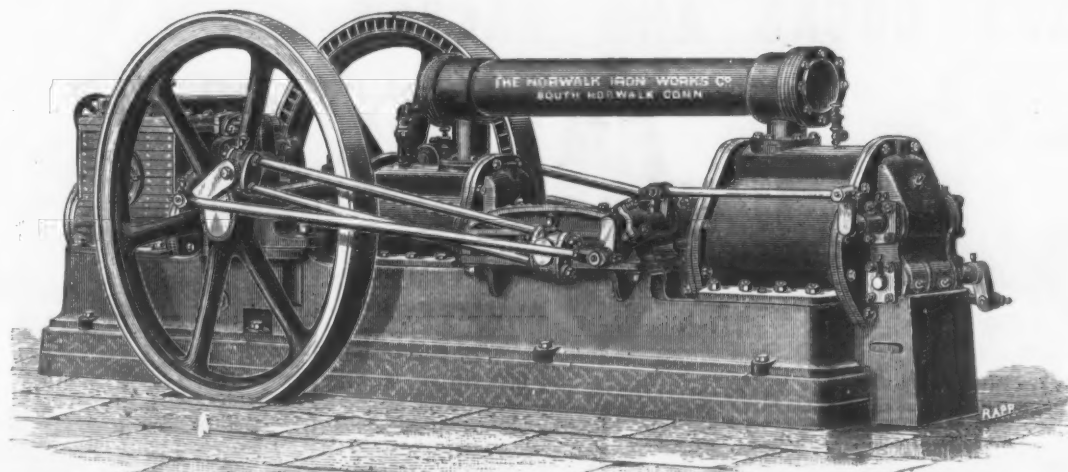
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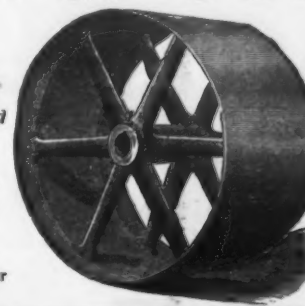
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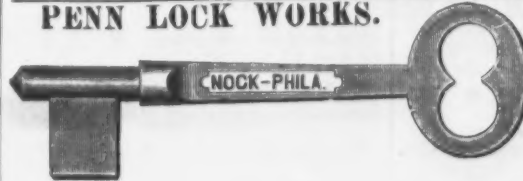
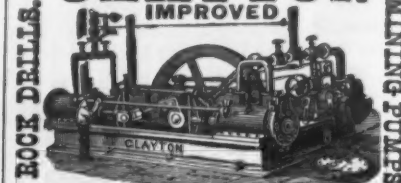
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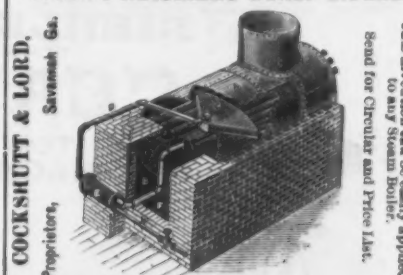
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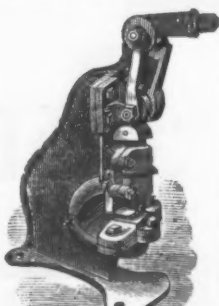
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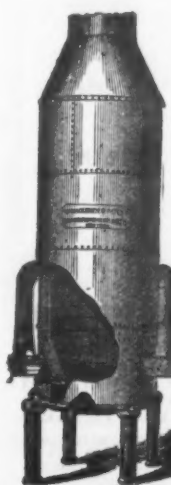
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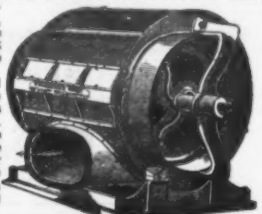


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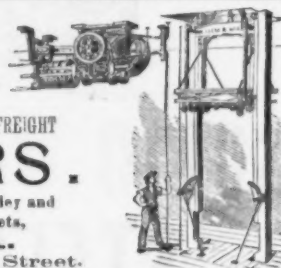
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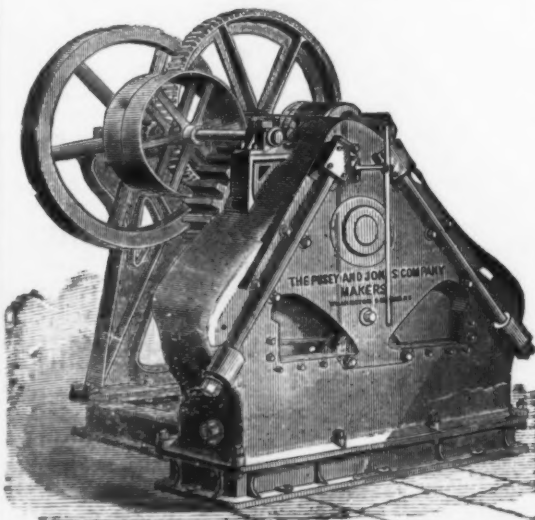
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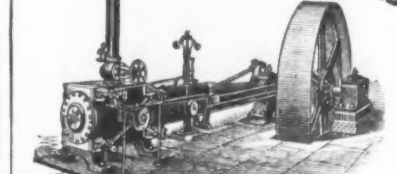
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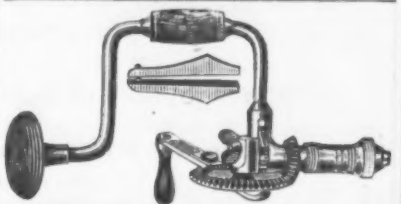
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